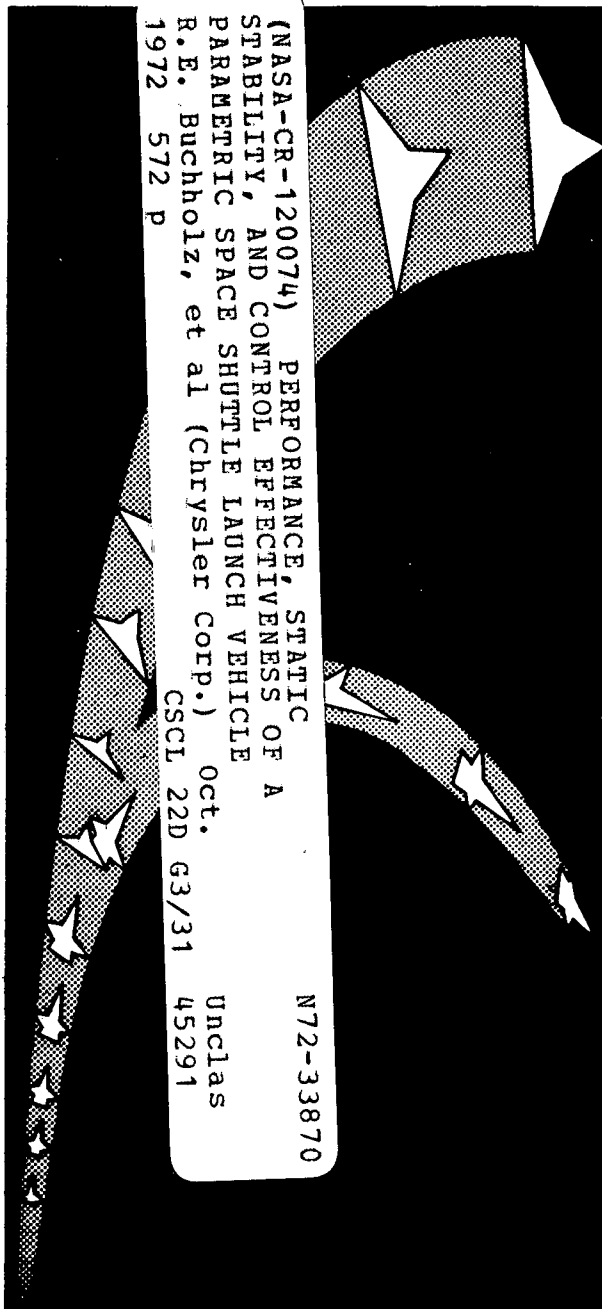


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CR-120,074
OCTOBER 1972



—SPACE SHUTTLE—

PERFORMANCE, STATIC STABILITY AND CONTROL EFFECTIVENESS OF A PARAMETRIC SPACE SHUTTLE LAUNCH VEHICLE

by

Robert E. Buchholz, LMSC/HREC
Mickey Gamble, LMSC/HREC

MSFC 14x14 INCH
TRISONIC WIND TUNNEL

Marshall Space
Flight Center

N A S A

SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER



This document should
be referenced as
NASA CR-120,074



SADSAC/SPACE SHUTTLE
WIND TUNNEL TEST DATA REPORT

CONFIGURATION: PARAMETRIC SPACE SHUTTLE LAUNCH VEHICLE

TEST PURPOSE: PERFORMANCE, STATIC STABILITY, AND CONTROL EFFECTIVENESS OF A
PARAMETRIC SPACE SHUTTLE LAUNCH VEHICLE.

TEST FACILITY: NASA/MSFC 14 x 14 - INCH TRISONIC WIND TUNNEL

TESTING AGENCY: Lockheed Missiles & Space Company

TEST NO. & DATE: MSFC TWT 544X - July 25 - August 7, 1972

FACILITY COORDINATOR: JIM WEAVER

PROJECT ENGINEER(S): ROBERT E. BUCHHOLZ
MICKEY GAMBLE

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CONTRACT NAS 8-4016

AMENDMENT 174

DRL 297 - 84a

This report has been prepared by Chrysler Corporation Space Division under a Data Management Contract to the NASA. Chrysler assumes no responsibility for the data presented herein other than its display characteristics.

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PERFORMANCE, STATIC STABILITY, AND CONTROL
EFFECTIVENESS OF A PARAMETRIC SPACE
SHUTTLE LAUNCH VEHICLE

By Robert E. Buchholz and Mickey Gamble

S U M M A R Y

This test was run as a continuation of a prior investigation* of aerodynamic performance and static stability for a parametric space shuttle launch vehicle. The purposes of this test were:

1. To obtain a more complete set of data in the transonic flight region.
2. To investigate new H-O tank noseshapes and tank diameters.
3. To obtain control effectiveness data for the orbiter at 0 degree incidence and with a smaller diameter H-O tank.
4. To determine the effects of varying solid rocket motor-to-HO tank gap size.

Experimental data were obtained for angles of attack from -10 to +10 degrees and for angles of sideslip from +10 to -10 degrees at Mach numbers ranging from .6 to 4.96.

* (Published as SADSAC report DMS-DR-1256)

NOMENCLATURE
General

| <u>SYMBOL</u> | <u>SADSAC SYMBOL</u> | <u>DEFINITION</u> |
|----------------|--------------------------|--|
| a | | speed of sound; m/sec, ft/sec |
| C _p | CP | pressure coefficient; $(p_1 - p_\infty)/q$ |
| M | MACH | Mach number; V/a |
| p | | pressure; N/m ² , psf |
| q | Q(NSM) Q(PSF) | dynamic pressure; $1/2\rho V^2$, N/m ² , psf |
| RN/L | RN/L | unit Reynolds number; per m, per ft |
| V | | velocity; m/sec, ft/sec |
| α | ALPHA | angle of attack, degrees |
| β | BETA | angle of sideslip, degrees |
| ψ | PSI | angle of yaw, degrees |
| ϕ | PHI | angle of roll, degrees |
| ρ | | mass density; kg/m ³ , slugs/ft ³ |

Reference & C.G. Definitions

| | | |
|----------------------|------|---|
| A _b | | base area; m ² , ft ² |
| b | BREF | wing span or reference span; m, ft |
| c.g. | | center of gravity |
| \bar{l}_{REF} c | LREF | reference length or wing mean aerodynamic chord; m, ft |
| S | SREF | wing area or reference area; m ² , ft ² |
| | MRP | moment reference point |
| | XMRP | moment reference point on X axis |
| | YMRP | moment reference point on Y axis |
| | ZMRP | moment reference point on Z axis |

SUBSCRIPTS

| | |
|----------|-------------------|
| b | base |
| l | local |
| s | static conditions |
| t | total conditions |
| ∞ | free stream |

NOMENCLATURE
(Continued)

Body-Axis System

| <u>SYMBOL</u> | <u>SADSAC SYMBOL</u> | <u>DEFINITION</u> |
|---------------|--------------------------|---|
| C_N | CN | normal-force coefficient; $\frac{\text{normal force}}{qS}$ |
| C_A | CA | axial-force coefficient; $\frac{\text{axial force}}{qS}$ |
| C_Y | CY | side-force coefficient; $\frac{\text{side force}}{qS}$ |
| C_{A_b} | CAB | base-force coefficient; $\frac{\text{base force}}{qS}$ $-A_b(p_b - p_\infty)/qS$ |
| C_{A_f} | CAF | forebody axial force coefficient; $C_A - C_{A_b}$ |
| C_m | CLM | pitching-moment coefficient; $\frac{\text{pitching moment}}{qS l_{REF}}$ |
| C_n | CYN | yawing-moment coefficient; $\frac{\text{yawing moment}}{qS b}$ |
| C_l | CBL | rolling-moment coefficient; $\frac{\text{rolling moment}}{qS b}$ |

NOMENCLATURE (Continued)

| <u>Symbol</u> | <u>SADSAC Symbol</u> | <u>Definition</u> |
|------------------------|--------------------------|--|
| $C_{A_\alpha} = 0$ | CAALFO | axial force coefficient at alpha equal zero degrees |
| $C_{Af_\alpha} = 0$ | CAFAFO | forebody axial force coefficient at alpha equal zero degrees |
| CLM_α | D(CLM) | pitching moment coefficient slope, $(\alpha \pm 5^\circ)$; per degree |
| CN_α | D(CN) | normal force coefficient slope, $(\alpha \pm 5^\circ)$; per degree |
| CLM_α/CN_α | DCLM/DCN | longitudinal static stability slope, pitching moment coefficient slope divided by the normal force coefficient slope, $D(CLM)/D(CN)$ |
| $C_{y\beta}$ | D(CY) | side force coefficient slope, $(\beta \pm 5^\circ)$; per degree |
| $C_{n\beta}$ | D(CYN) | yawing moment coefficient slope, $(\beta \pm 5^\circ)$; per degree |
| $C_{l\beta}$ | D(CBL) | rolling moment coefficient slope, $(\beta \pm 5^\circ)$; per degree |

NOMENCLATURE (Continued)

(Additions for MSFC Test 544X)

| <u>Symbol</u> | <u>SADSAC Symbol</u> | <u>Definition</u> |
|---------------|--------------------------|---|
| x_s | XS | longitudinal location of the nose of the solid rocket motors relative to H0 tank nose |
| y_s | YS | lateral distance between solid rocket motors and H0 tank |
| i | ORBINC | orbiter incidence angle relative to H0 tank longitudinal C_L ; positive when nose up; deg |
| γ | GAMZ | SRM nozzle position relative to H0 tank longitudinal centerline |
| ϕ_s | PHIS | radial position of solid rocket motors relative to the vertical plane, deg |
| δ | | control surface deflection angle; deg positive deflections are: |
| | ELEVTR | elevator - trailing edge down |
| | RUDDER | rudder - trailing edge to the left |

CONFIGURATIONS INVESTIGATED

The launch configuration consists of the double delta wing orbiter with one large liquid hydrogen-oxygen tank (HO) and two solid rocket motors (SRM) underslung beneath the orbiter (see Figure 2). Configuration components investigated were:

Symbol

| | |
|-----|--|
| O1 | baseline orbiter with abort solid rocket motors |
| O2 | baseline orbiter without abort solid rocket motors |
| T1 | 346-in. diam. HO tank with 22-deg nosecone |
| T3 | 346-in. diam. HO tank with 17-deg nosecone |
| T8 | 346-in. diam. HO tank with Generalized nosecone |
| T9 | 312-in. diam. HO tank with 17-deg nosecone |
| T10 | 346-in. diam. HO tank with modified Apollo nosecone |
| S1 | 156-in. diam. solid rocket motor with 17-deg nosecone |
| S6 | 156-in. diam. solid rocket motor with 17-deg nosecone without rocket nozzle |

TEST FACILITY DESCRIPTION

The Marshall Space Flight Center 14" x 14" Trisonic Wind Tunnel is an intermittent blowdown tunnel which operates by high pressure air flowing from storage to either vacuum or atmospheric conditions. A Mach number range from .2 to 5.85 is covered by utilizing two interchangeable test sections. The transonic section permits testing at Mach 0.20 through 2.50, and the supersonic section permits testing at Mach 2.74 through 5.85. Mach numbers between .2 and .9 are obtained by using a controllable diffuser. The range from .95 to 1.3 is achieved through the use of plenum suction and perforated walls. Mach numbers of 1.44, 1.93 and 2.50 are produced by interchangeable sets of fixed contour nozzle blocks. Above Mach 2.50 a set of fixed contour nozzle blocks are tilted and translated automatically to produce any desired Mach number in .25 increments.

Air is supplied to a 6000 cubic foot storage tank at approximately -40°F dew point and 500 psi. The compressor is a three-stage reciprocating unit driven by a 1500 hp motor.

The tunnel flow is established and controlled with a servo actuated gate valve. The controlled air flows through the valve diffuser into the stilling chamber and heat exchanger where the air temperature can be controlled from ambient to approximately 180°F. The air then passes through the test section which contains the nozzle blocks and test region.

Downstream of the test section is a hydraulically controlled pitch sector that provides a total angle of attack range of 20° (+ 10°). Sting offset and extensions are available for obtaining various maximum angles of attack up to 90°.

MODEL DESCRIPTION

The model geometry is specified in Figs. 2 through 8. The SRM boosters and HO tanks are constructed of aluminum. The orbiter wing and body are aluminum and the elevons, fins and rudder flares are 17-4 PH stainless steel. The launch configuration has a complete build-up and parametric capability (SRM and HO tank nose shape, body diameter, body length, SRM longitudinal and radial location, HO tank vertical fin size, and orbiter incidence). In addition, the orbiter control surfaces can be deflected to provide additional control for the launch configuration. The launch vehicle SRM's and HO tanks were manufactured at MSFC and the orbiter was manufactured at Lockheed-Huntsville. All model components are available at the MSFC 14 x 14-inch Wind Tunnel facility.

DATA REDUCTION

All model forces and moments were resolved in the body axis system and are presented in the form of non-dimensional coefficients. Model reference dimensions used in the data reduction are:

| Parameter | Full Scale | Model Scale |
|---|-------------------------|------------------------|
| Reference Area (S_{ref}) (Wing Theoretical Area) | 3420.0 ft. ² | 7.880 in. ² |
| Reference Length (l_{ref}) (M.A.C.) | 507.0 in. | 2.028 in. |
| Reference Span (b_{ref}) (Wing Span) | 1115.0 in. | 4.460 in. |
| Moment Reference Point (MRP) | | |
| from base | 840.0 in. | 3.360 in. |
| above HO tank centerline | 62.0 in. | 0.248 in. |

Base pressure coefficients were calculated using the following equations:

$$CAB_O = -CPB1 \frac{A_{bo}}{S_{ref}} \text{ (Orbiter base axial force coefficient)}$$

$$CAB_S = -CPB2 \frac{A_{bs}}{S_{ref}} \text{ (SRM base axial force coefficient)}$$

$$CAB_{HO} = -CPB3 \frac{A_{bHO}}{S_{ref}} \text{ (HO tank base axial force coefficient)}$$

where: $CPB1 = (P_{bo} - P_{\infty})/q$

$$CPB2 = (P_{bs} - P_{\infty})/q$$

$$CPB3 = (P_{bHO(avg)} - P_{\infty})/q$$

The following combinations of SRM and HO tank required the following base areas to be used for axial force corrections.

| Configuration | A_{bo} (in. ²) | A_{bs} (in. ²) | A_{bHO} (in. ²) |
|---------------|------------------------------|------------------------------|-------------------------------|
| T101S1 | 0.732 | 0.306 | 1.504 |
| T301S1 | 0.732 | 0.306 | 1.504 |
| T801S1 | 0.732 | 0.306 | 1.504 |
| T901S1 | 0.732 | 0.306 | 1.223 |
| T1001S1 | 0.732 | 0.306 | 1.504 |
| T301S6 | 0.732 | 0.306 | 1.504 |

TABLE I

TEST CONDITIONS
TEST MSFC TWT 544X

| MACH NUMBER | REYNOLDS NUMBER per unit length | DYNAMIC PRESSURE (pounds/sq. inch) | STAGNATION TEMPERATURE (degrees Fahrenheit) |
|-------------|------------------------------------|---------------------------------------|--|
| .60 | $4.4 \times 10^6/\text{Ft.}$ | 3.91 | 100° |
| .80 | $5.3 \times 10^6/\text{Ft.}$ | 5.94 | 100° |
| .90 | $5.6 \times 10^6/\text{Ft.}$ | 6.73 | 100° |
| 1.00 | $5.8 \times 10^6/\text{Ft.}$ | 7.40 | 100° |
| 1.10 | $5.9 \times 10^6/\text{Ft.}$ | 7.94 | 100° |
| 1.20 | $5.9 \times 10^6/\text{Ft.}$ | 8.30 | 100° |
| 1.46 | $5.9 \times 10^6/\text{Ft.}$ | 8.60 | 100° |
| 1.96 | $6.8 \times 10^6/\text{Ft.}$ | 9.91 | 100° |
| 3.48 | $6.4 \times 10^6/\text{Ft.}$ | 6.86 | 140° |
| 4.96 | $5.0 \times 10^6/\text{Ft.}$ | 3.07 | 140° |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

BALANCE UTILIZED: MSFC 232

CAPACITY:

NF 300 lbs.
 SF 143 lbs.
 AF 50 lbs.
 PM 400 in-lbs.
 YM 192 in-lbs.
 RM 100 in-lbs.

ACCURACY:

+ 1.5 lbs.
+ .72 lbs.
+ .25 lbs.
+ 2.0 in-lbs.
+ .96 in-lbs.
+ .50 in-lbs.

COEFFICIENT

TOLERANCE: $q = 9.2$

+ .0207
+ .0136
+ .0035
+ .0099
+ .0030
+ .0016

COMMENTS:

TABLE II

TEST TWT 544x DATA SET COLLATION SHEET☐ PRETEST☒ POSTTEST

| DATA SET IDENTIFIER | CONFIGURATION | SCHD. | | PARAMETERS/VALUES | | | | NO. of RUNS | MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) | | | | | | | | | |
|---------------------|---------------|-------|---|-------------------|------------|------------|------------|-------------|--|-----|-----|-----|-----|-----|------|------|-----|------|
| | | a | B | δ_a | δ_b | δ_c | δ_d | | .6 | .8 | .9 | 1.0 | 1.1 | 1.2 | 1.46 | 1.92 | 3.5 | 4.92 |
| R71089 | T30151 | A | O | 0 | 0 | 0.0 | 023 | 6 | 339 | 340 | 341 | 344 | 345 | 347 | | | | |
| 090 | Y | O | A | | | | | 6 | 350 | 349 | 348 | 345 | 346 | 347 | | | | |
| 091 | T30251 | A | O | | | | | 5 | | | | | | 485 | 555 | 433 | 375 | 374 |
| 092 | | O | A | | Y | | | 5 | | | | | | 494 | 554 | 434 | 372 | 373 |
| 093 | | A | O | | 30 | | | 5 | | | | | | 584 | 556 | 436 | 380 | 381 |
| 094 | Y | O | A | | | | | 5 | | | | | | 585 | 557 | 437 | 379 | 378 |
| 095 | T30151 | A | O | | | | | 6 | 581 | 490 | 582 | 489 | 488 | 583 | | | | |
| 096 | | O | A | Y | Y | | | 6 | 580 | 491 | 579 | 492 | 493 | 578 | | | | |
| 097 | | A | O | 10 | 0 | | | 6 | 574 | 485 | 573 | 486 | 487 | 572 | | | | |
| 098 | Y | O | A | | | | | 6 | 575 | 484 | 576 | 483 | 482 | 577 | | | | |
| 099 | T30251 | A | O | | | | | 5 | | | | | | 571 | 559 | 437 | 384 | 383 |
| 100 | | O | A | Y | | | | 5 | | | | | | 570 | 558 | 438 | 385 | 386 |
| 101 | | A | O | -10 | | | | 5 | | | | | | 563 | 560 | 440 | 389 | 390 |
| 102 | Y | O | A | | | | | 5 | | | | | | 562 | 561 | 439 | 388 | 387 |
| 103 | T30151 | A | O | | | | | 6 | 566 | 478 | 565 | 477 | 476 | 564 | | | | |
| 104 | | O | A | Y | | | Y | 6 | 567 | 479 | 568 | 480 | 481 | 569 | | | | |
| 105 | | A | O | 0 | | | 073 | 4 | 463 | 462 | 460 | | | 461 | | | | |
| 106 | | O | A | | | | 073 | 4 | 464 | 465 | 466 | | | 467 | | | | |
| 107 | | A | O | | | | 123 | 4 | 472 | 473 | 474 | | | 475 | | | | |
| Y 108 | Y | O | A | Y | Y | Y | 123 | 4 | 471 | 470 | 469 | | | 468 | | | | |

| | | | | | | | | | | | | | |
|-----|-----|-----|-----|------|-----|------|------|------|-----|----|----|----|----|
| 1 | 7 | 13 | 19 | 25 | 31 | 37 | 43 | 49 | 55 | 61 | 67 | 75 | 76 |
| CLM | ICN | ICY | EBL | ICYN | CAT | CAB1 | CAS2 | CAB3 | CAF | | | | 10 |

COEFFICIENTS:

a or B

SCHEDULES

A: $A = -10^\circ$ to 10° by $\Delta\alpha = 2^\circ$ B: $A = -10^\circ$ to 10° by $\Delta\alpha = 2^\circ$

IDPVAR(1) IDPVAR(2) NDV



TABLE II (CONTINUED)
TEST TWT 544x DATA SET COLLATION SHEET

☐ PRETEST

☒ POSTTEST

| DATA SET IDENTIFIER | CONFIGURATION | SCHD. | | PARAMETERS/VALUES | | | | NO. of RUNS | MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) | | | | | | | | | |
|---------------------|---------------|----------|---------|-------------------|------------|------------|-------|-------------|--|-----|-----|-----|-----|-----|-----|-------|-----|-----|
| | | α | β | δ_e | δ_r | δ_o | Y_s | | .6 | .8 | .9 | 1.0 | 1.1 | 1.2 | 1.4 | 1.9 | 3.5 | 4.9 |
| R 71109 | T30151 | A | O | 0 | 0 | 0.0 | .223 | 4 | 449 | 448 | 447 | | | 351 | | | | |
| 110 | ↓ | O | A | | | | .223 | 4 | 450 | 451 | 452 | | | 453 | | | | |
| 111 | T30251 | A | O | | | | .073 | 2 | | | | | | | 428 | | 391 | |
| 112 | ↓ | O | A | | | | .073 | 2 | | | | | | | 427 | | 392 | |
| 113 | ↓ | A | O | | | | .123 | 2 | | | | | | | 425 | | 394 | |
| 114 | ↓ | O | A | | | | .123 | 2 | | | | | | | 426 | | 393 | |
| 115 | ↓ | A | O | | | | .223 | 2 | | | | | | | 429 | | 376 | |
| 116 | ↓ | O | A | | | | .223 | 2 | | | | | | | 430 | | 377 | |
| 117 | T30256 | A | O | | | | .073 | 2 | | | | | | | 552 | 432 | | |
| 118 | ↓ | O | A | | | | | 2 | | | | | | | 553 | 431 | | |
| 119 | T30156 | A | O | | | | | 2 | | | 457 | | | 456 | | | | |
| 120 | ↓ | O | A | | | Y | | 2 | | | 458 | | | 459 | | | | |
| 121 | T80151 | A | O | | | -1.5 | | 6 | 315 | 316 | 317 | 320 | 319 | 318 | | | | |
| 122 | ↓ | O | A | | | | | 6 | 326 | 325 | 324 | 321 | 322 | 323 | | | | |
| 123 | T80251 | A | O | | | | | 5 | | | | | | 446 | 352 | 360 | 366 | 365 |
| 124 | ↓ | O | A | | | | | 5 | | | | | | 445 | 355 | 354/1 | 367 | 368 |
| 125 | T100251 | A | O | | | | | 5 | | | | | | 443 | 353 | 361 | 362 | 363 |
| 126 | ↓ | O | A | | | | | 5 | | | | | | 444 | 354 | 357 | 371 | 370 |
| 127 | T100151 | A | O | | | | | 6 | 338 | 337 | 336 | 333 | 334 | 335 | | | | |
| Y 128 | ↓ | O | A | Y | Y | Y | Y | 6 | 327 | 328 | 329 | 332 | 331 | 330 | | | | |

12

| | | | | | | | | | | | | | |
|-----|----|----|-----|-----|-----|------|------|------|-----|----|----|----|----|
| 1 | 7 | 13 | 19 | 25 | 31 | 37 | 43 | 49 | 55 | 61 | 67 | 75 | 76 |
| CLM | CN | CY | CBL | CYN | CAT | CAB1 | CAB2 | CAB3 | CAF | | | | 10 |

COEFFICIENTS:

α or β

SCHEDULES

α : $A = -10^\circ$ to 10° by $\Delta\alpha = 2^\circ$

β : $A = -10^\circ$ to 10° by $\Delta\beta = 2^\circ$

→ IDPVAR(1) IDPVAR(2) NDV

TABLE II (CONTINUED)

TEST TWT544x DATA SET COLLATION SHEET☐ PRETEST☒ POSTTEST

| DATA SET IDENTIFIER | CONFIGURATION | SCHD. | | PARAMETERS/VALUES | | | | NO. of RUNS | MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) | | | | | | | | | |
|---------------------|---------------|-------|---|-------------------|---------------|----------------|----------------|-------------|--|-----|-----|-----|-----|-----|------|------|-----|------|
| | | A | B | $\Delta\alpha$ | $\Delta\beta$ | $\Delta\gamma$ | $\Delta\delta$ | | .6 | .8 | .9 | 1.0 | 1.1 | 1.2 | 1.46 | 1.96 | 3.5 | 4.96 |
| R71129 | T90151 | A | O | O | O | -1.5 | .02 | 6 | 534 | 535 | 536 | 537 | 538 | 539 | | | | |
| 130 | ↓ | O | A | | | | | 6 | 533 | 532 | 531 | 530 | 529 | 528 | | | | |
| 131 | T90251 | A | O | | | | | 5 | | | | | | 540 | 543 | 424 | 396 | 395 |
| 132 | ↓ | O | A | | | Y | | 5 | | | | | | 541 | 542 | 423 | 397 | 398 |
| 133 | ↓ | A | O | | | 0.0 | | 5 | | | | | | 496 | 544 | 421 | 401 | 402 |
| 134 | ↓ | O | A | | | | | 5 | | | | | | 497 | 545 | 422 | 400 | 399 |
| 135 | T90151 | A | O | | | | | 6 | 506 | 507 | 508 | 505 | 504 | 509 | | | | |
| 136 | ↓ | O | A | | | Y | | 6 | 501 | 500 | 499 | 502 | 503 | 498 | | | | |
| 137 | ↓ | A | O | | 30 | | | 3 | 512 | | 511 | | | 510 | | | | |
| 138 | ↓ | O | A | | | | | 3 | 513 | | 514 | | | 515 | | | | |
| 139 | T90251 | A | O | | | | | 4 | | | | | | | 547 | 416 | 412 | 411 |
| 140 | ↓ | O | A | Y | Y | | | 4 | | | | | | | 546 | 415 | 413 | 414 |
| 141 | ↓ | A | O | 10 | 0 | | | 4 | | | | | | | 548 | 417 | 409 | 410 |
| 142 | ↓ | O | A | | | | | 4 | | | | | | | 549 | 418 | 408 | 407 |
| 143 | T90151 | A | O | | | | | 3 | 519 | | 520 | | | 521 | | | | |
| 144 | ↓ | O | A | Y | | | | 3 | 518 | | 517 | | | 516 | | | | |
| 145 | ↓ | A | O | -10 | | | | 3 | 524 | | 523 | | | 522 | | | | |
| 146 | ↓ | O | A | | | | | 3 | 525 | | 522 | | | 527 | | | | |
| 147 | T90251 | A | O | | | | | 4 | | | | | | | 551 | 420 | 404 | 403 |
| Y 148 | ↓ | O | A | Y | Y | Y | Y | 4 | | | | | | | 550 | 419 | 405 | 406 |

1 7 13 19 25 31 37 43 49 55 61 67 7576

CLM CN CY CBL CYN CAT CAB1 CAB2 CAB3 CAF 10

COEFFICIENTS:

α or β

SCHEDULES

α: A = -10° to 10° by Δα = 2°

β: A = -10° to 10° by Δβ = 2°

IDPVAR(1) IDPVAR(2) NDV

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TEST TWT 544x DATA SET COLLATION SHEET

☒ POSTTEST

COEFFICIENTS: $\alpha: A = -10^\circ$ to 10° by $\Delta\alpha = 2^\circ$ \Rightarrow IDPVAR(1) IDPVAR(2) NDV
 a or β $\beta: A = -10^\circ$ to 10° by $\Delta\beta = 2^\circ$
 SCHEDULES

TABLE III
DIMENSIONAL DATA

Configuration 01

Double Delta Winged Orbiter. Consists of the following components:

B1
W4
V11
A1
E1
R1

Dimensional Data for these components is shown on the following pages.

TABLE III (CONTINUED)

MODEL COMPONENT: BODY - B1GENERAL DESCRIPTION: Basic orbiter body including canopy
and manipulator arm housing.

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|------------------------------|------------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> (.004) | <u>MODEL SCALE</u> |
| Length | <u>1315 in.</u> | <u>5.260 in.</u> | _____ |
| Max. Width (P.L. Bay / Base) | <u>208/220 in.</u> | <u>.832/.880 in.</u> | _____ |
| Max. Depth | <u>235 in.</u> | <u>.940 in.</u> | _____ |
| Fineness Ratio | <u>6.32</u> | <u>6.32</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | _____ | _____ | _____ |
| Planform | _____ | _____ | _____ |
| Wetted | <u>6250 ft.²</u> | <u>14.40 in.²</u> | _____ |
| Base Projected | <u>317.7 ft.²</u> | <u>.732 in.²</u> | _____ |

TABLE III (CONTINUED)

MODEL COMPONENT: W4GENERAL DESCRIPTION: Double Delta Wing

DRAWING NUMBER: _____

DIMENSIONS:THEORETICALACTUAL MEASUREDTOTAL DATAFULL-SCALEMODEL SCALE
(.004)MODEL SCALE

Area

Planform Basic/Glove

3420/1187 ft.²7.880/2.735 in.²

Wetted Basic/Glove

4925/219 ft.²11.35/1.89 in.²

Span (equivalent)

1115 in.4.460 in.

Aspect Ratio Basic/Glove

2.5/1.92.5/1.9

Rate of Taper

——

Taper Ratio Basic/Glove

0.25/0.100.25/0.10

Dihedral Angle, degrees

7°7°

Incidence Angle, degrees

1.5°1.5°

Aerodynamic Twist, degrees

——

Toe-In Angle

——

Cant Angle

——

Sweep Back Angles, degrees

——

Leading Edge Basic/Glove

35°/75°35°/75°

Trailing Edge

-19.6°-19.6°

0.25 Element Line

——

Chords:

Root (Wing Sta. 0.0) 2/G

736/720 in.2.944/2.880 in.

Tip, (equivalent)

147 in.0.588 in.

MAC Basic

507 in.2.028 in.

Fus. Sta. of .25 MAC

——

W.P. of .25 MAC

——

B.L. of .25 MAC

217 in.0.868 in.

Airfoil Section

Root

0008-640008-64

Tip

0008-640008-64EXPOSED DATA

Area Basic/Glove

1218.95/162.55 ft.²2.806/0.374 in.²

Span, (equivalent)

453.5 in.1.814 in.

Aspect Ratio

——

Taper Ratio

——

Chords

Root Basic/Glove

626.87/404.74 in.2.507/1.619 in.

Tip

147 in.0.588 in.

MAC

——

Fus. Sta. of .25 MAC

——

W.P. of .25 MAC

——

B.L. of .25 MAC

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best available copy.

TABLE III (CONTINUED)

MODEL COMPONENT: V 11GENERAL DESCRIPTION: Twin vertical tails (Dimensions are for a single panel.)

DRAWING NUMBER: _____

DIMENSIONS:

| <u>TOTAL DATA</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------------|----------------------|-----------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> (004) | <u>MODEL SCALE</u> |
| Area | | | |
| Planform | — | — | |
| Wetted | 525 Ft. ² | 1.21 in. ² | |
| Span (equivalent) | — | — | |
| Aspect Ratio | — | — | |
| Rate of Taper | — | — | |
| Taper Ratio | — | — | |
| Diehedral Angle, degrees | 75° | 75° | |
| Incidence Angle, degrees | 0° | 0° | |
| Aerodynamic Twist, degrees | 0° | 0° | |
| Toe-In Angle | 0° | 0° | |
| Cant Angle | 15° | 15° | |
| Sweep Back Angles, degrees | | | |
| Leading Edge | 45° | 45° | |
| Trailing Edge | 20° | 20° | |
| 0.25 Element Line | — | — | |
| Chords: | | | |
| Root (Wing Sta. 0.0) | — | — | |
| Tip, (equivalent) | — | — | |
| MAC | — | — | |
| Fus. Sta. of .25 MAC | — | — | |
| W.P. of .25 MAC | — | — | |
| B.L. of .25 MAC | — | — | |
| Airfoil Section | | | |
| Root | 5° wedge (60/40) | 5° wedge (60/40) | |
| Tip | 5° wedge (60/40) | 5° wedge (60/40) | |
| <u>EXPOSED DATA</u> | | | |
| Area | 250 Ft. ² | 250 Ft. ² | |
| Span, (equivalent) | 240 in. | 240 in. | |
| Aspect Ratio | 1.6 | 1.6 | |
| Taper Ratio | 0.35 | 0.35 | |
| Chords | | | |
| Root | 230 in. | 0.920 in. | |
| Tip | 80 in. | 0.320 in. | |
| MAC | — | — | |
| Fus. Sta. of .25 MAC | — | — | |
| W.P. of .25 MAC | — | — | |
| B.L. of .25 MAC | — | — | |

TABLE III (CONTINUED)


 Reproduced from
best available copy.
MODEL COMPONENT: BODY - A1

GENERAL DESCRIPTION: About SRM pods. Cone cylinders with a
22.5° half angle nose cone. Rocket nozzle is a 22.5°
cone. Nose radius is .025 in. model scale and 3.5 in full
scale.

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|----------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> (.004) | <u>MODEL SCALE</u> |
| Length | <u>342 in.</u> | <u>1.368 in.</u> | _____ |
| Max. Width | <u>62 in.</u> | <u>.248 in.</u> | _____ |
| Max. Depth | <u>—</u> | <u>—</u> | _____ |
| Fineness Ratio | <u>5.52</u> | <u>5.52</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>22.3 ft²</u> | <u>.0515 in.²</u> | _____ |
| Planform | <u>—</u> | <u>—</u> | _____ |
| Wetted | <u>—</u> | <u>—</u> | _____ |
| Base | <u>—</u> | <u>—</u> | _____ |

TABLE III (CONTINUED)

MODEL COMPONENT: E1GENERAL DESCRIPTION: Wing elevon. Dimensions refer to a single panel.

DRAWING NUMBER: _____

DIMENSIONS:

| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> |
|--|------------------------------|-----------------------------|
| Area, ft ² | <u>371.3 ft.²</u> | <u>.855 in.²</u> |
| Span (equivalent), inches | <u>399.0 in.</u> | <u>1.596 in.</u> |
| Inb'd equivalent chord, inches | <u>204.0 in.</u> | <u>.816 in.</u> |
| Outb'd equivalent chord, inches | <u>64.0 in.</u> | <u>.256 in.</u> |
| Ratio Elevator chord/horizontal tail chord | | |
| At Inb'd equiv. chord | <u>-</u> | <u>-</u> |
| At Outb'd equiv. chord | <u>-</u> | <u>-</u> |
| Sweep Back Angles, degrees | | |
| Leading Edge | <u>0.0</u> | <u>0.0</u> |
| Tailing Edge | <u>-19°36'</u> | <u>-19°36'</u> |
| Hingeline | <u>0.0</u> | <u>0.0</u> |
| Area Moment (Normal to hinge line) ft ³ | <u>-</u> | <u>-</u> |

TABLE III (CONTINUED)

MODEL COMPONENT: R1

GENERAL DESCRIPTION: Rudder

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> |
|--|------------------------------|-----------------------------|
| Area, ft | <u>102.4 ft.²</u> | <u>.236 in.²</u> |
| Span (equivalent), inches | <u>233.3 in.</u> | <u>.933 in.</u> |
| Inb'd equivalent chord, inches | <u>94.5 in.</u> | <u>.378 in.</u> |
| Outb'd equivalent chord, inches | <u>32.0 in.</u> | <u>.128 in.</u> |
| Ratio Rudder chord/horizontal tail chord | | |
| At Inb'd equiv. chord | <u>.40</u> | <u>.40</u> |
| At Outb'd equiv. chord | <u>.40</u> | <u>.40</u> |
| Sweep Back Angles, degrees | | |
| Leading Edge | <u>32° 36'</u> | <u>32° 36'</u> |
| Tailing Edge | <u>20° 34'</u> | <u>20° 34'</u> |
| Hingeline | <u>32° 36'</u> | <u>32° 36'</u> |
| Area Moment (Normal to hinge line) ft ³ | <u>-</u> | <u>-</u> |

Configuration 02

Double Delta Winged Orbiter. Same as 01 except does not have abort SRM's (A1).

TABLE III (CONTINUED)

MODEL COMPONENT: BODY - T1GENERAL DESCRIPTION: Hydrogen - Oxygen Tank with 22° nosecone.

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|-------------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> | <u>MODEL SCALE</u> |
| Length | <u>1876.75 in.</u> | <u>7.507 in.</u> | _____ |
| Max. Width | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Max. Depth | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Fineness Ratio | <u>5.42</u> | <u>5.42</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>652.95 ft.²</u> | <u>1.504 in.²</u> | _____ |
| Planform | <u>-</u> | <u>-</u> | _____ |
| Wetted | <u>-</u> | <u>-</u> | _____ |
| Base | <u>652.95 ft.²</u> | <u>1.504 in.²</u> | _____ |

TABLE III (CONTINUED)

MODEL COMPONENT: BODY - T3GENERAL DESCRIPTION: Hydrogen-Oxygen Tank with 17° nose cone.

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|-------------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> | <u>MODEL SCALE</u> |
| Length | <u>2031.75 in.</u> | <u>8.127 in.</u> | _____ |
| Max. Width | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Max. Depth | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Fineness Ratio | <u>5.87</u> | <u>5.87</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>652.95 ft.²</u> | <u>1.504 in.²</u> | _____ |
| Planform | <u>-</u> | <u>-</u> | _____ |
| Wetted | <u>-</u> | <u>-</u> | _____ |
| Base | <u>652.95 ft.²</u> | <u>1.504 in.²</u> | _____ |

TABLE III (CONTINUED)

MODEL COMPONENT: BODY - T8GENERAL DESCRIPTION: Hydrogen-Oxygen Tank with Generalized Nose Shape.

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|-------------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> | <u>MODEL SCALE</u> |
| Length | <u>1935 in.</u> | <u>7.740 in.</u> | _____ |
| Max. Width | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Max. Depth | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Fineness Ratio | <u>5.59</u> | <u>5.59</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>652.95 ft.²</u> | <u>1.504 in.²</u> | _____ |
| Planform | <u>—</u> | <u>—</u> | _____ |
| Wetted | <u>—</u> | <u>—</u> | _____ |
| Base | <u>652.95 ft.²</u> | <u>1.504 in.²</u> | _____ |

TABLE III (CONTINUED)

MODEL COMPONENT: BODY - T9GENERAL DESCRIPTION: 3/2" Hydrogen-Oxygen Tank with 17° nose cone

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|-----------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> | <u>MODEL SCALE</u> |
| Length | <u>2328.5 in.</u> | <u>9.314 in.</u> | _____ |
| Max. Width | <u>312 in.</u> | <u>1.248 in.</u> | _____ |
| Max. Depth | <u>312 in.</u> | <u>1.248 in.</u> | _____ |
| Fineness Ratio | <u>7.46</u> | <u>7.46</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>530.8 ft²</u> | <u>1.223 in.²</u> | _____ |
| Planform | <u>-</u> | <u>-</u> | _____ |
| Wetted | <u>-</u> | <u>-</u> | _____ |
| Base | <u>530.8 ft²</u> | <u>1.223 in.²</u> | _____ |

TABLE III (CONTINUED)

MODEL COMPONENT: BODY - T10Reproduced from
best available copy.GENERAL DESCRIPTION: Hydrogen-Oxygen Tank with Modified Apollo
Nose cone. Include external retro-rockets.

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|------------------------------|-----------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> | <u>MODEL SCALE</u> |
| Length | <u>2162 in.</u> | <u>8.648 in.</u> | _____ |
| Max. Width | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Max. Depth | <u>346 in.</u> | <u>1.384 in.</u> | _____ |
| Fineness Ratio | <u>6.25</u> | _____ | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>652.95 ft²</u> | <u>1.504 in²</u> | _____ |
| Planform | <u>—</u> | <u>—</u> | _____ |
| Wetted | <u>—</u> | <u>—</u> | _____ |
| Base | <u>652.95 ft²</u> | <u>1.504 in²</u> | _____ |

TABLE III (CONTINUED)

MODEL COMPONENT: BODY - S1GENERAL DESCRIPTION: SOLID ROCKET MOTOR

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|------------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> | <u>MODEL SCALE</u> |
| Length | <u>1743 in.</u> | <u>6.972 in.</u> | _____ |
| Max. Width | <u>156 in.</u> | <u>0.624 in.</u> | _____ |
| Max. Depth | <u>156 in.</u> | <u>0.624 in.</u> | _____ |
| Fineness Ratio | <u>11.17</u> | <u>11.17</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>132.5 ft.²</u> | <u>0.306 in.²</u> | _____ |
| Planform | <u>-</u> | <u>-</u> | _____ |
| Wetted | <u>-</u> | <u>-</u> | _____ |
| Base | <u>132.5 ft.²</u> | <u>0.306 in.²</u> | _____ |

TABLE III (CONTINUED)

Reproduced from
best available copy.


MODEL COMPONENT: BODY - 56GENERAL DESCRIPTION: SOLID ROCKET MOTOR with out nozzle

DRAWING NUMBER: _____

| <u>DIMENSIONS:</u> | <u>THEORETICAL</u> | | <u>ACTUAL MEASURED</u> |
|----------------------|-----------------------------|------------------------------|------------------------|
| | <u>FULL-SCALE</u> | <u>MODEL SCALE</u> | <u>MODEL SCALE</u> |
| Length | <u>1743 in.</u> | <u>6.972</u> | _____ |
| Max. Width | <u>156 in.</u> | <u>0.624 in.</u> | _____ |
| Max. Depth | <u>156 in.</u> | <u>0.624 in.</u> | _____ |
| Fineness Ratio | <u>11.17</u> | <u>11.17</u> | _____ |
| Area | | | |
| Max. Cross-Sectional | <u>132.5 ft²</u> | <u>0.306 in.²</u> | _____ |
| Planform | <u>—</u> | <u>—</u> | _____ |
| Wetted | <u>—</u> | <u>—</u> | _____ |
| Base | <u>132.5 ft²</u> | <u>0.306 in.²</u> | _____ |

TABLE IV
INDEX OF MODEL FIGURES

| Figure | Description | Page |
|--------|---|------|
| 1 | Axis System | 33 |
| 2 | Launch Vehicle | 34 |
| 3 | General Arrangement, Space Shuttle Orbiter | 35 |
| 4 | Baseline Solid Rocket Motor | 36 |
| 5 | 346-Inch Diameter HO Tank with 17-Degree Nosecone | 37 |
| 6 | T8, 346-Inch HO Tank Nosecone | 38 |
| 7 | T9, 346-Inch Diameter HO Tank | 39 |
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| 9 | Photograph of Configuration T ₉ O ₁ S ₁ | 41 |
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TABLE V
INDEX OF DATA FIGURES

| TITLE | PLOTTED COEFFICIENTS SCHEDULE | CONDITIONS VARYING | PAGES |
|--|-------------------------------------|---------------------------------|-------------------------------|
| EFFECT OF HO TANK NOSE SHAPE | (A) (B) | MACH CONFIGURATION ORBINC | 1-60 61-70 |
| EFFECT OF HO TANK DIAMETER | (A) (B) | MACH CONFIGURATION | 71-130 131-140 |
| VARIATION OF SRM-HO TANK GAP | (A) (B) | MACH YS | 141-176 177-184 |
| VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK | (A) (B) | MACH CONFIGURATION ORBINC | 185-244 245-254 |
| EFFECT OF SRM ROCKET NOZZLES | (A) (B) | MACH CONFIGURATION | 255-278 279-282 |
| EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE | (A) (B) (C) | MACH ELEVTR CONFIGURATION | 283-342 343-352 353-362 |
| EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK | (A) (B) (C) | MACH CONFIGURATION ELEVTR | 363-404 405-411 412-418 |
| EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE | (A) (D) (B) | MACH CONFIGURATION RUDDER | 419-478 479-488 489-498 |

TABLE V (CONTINUED)

| TITLE | PLOTTED COEFFICIENTS SCHEDULE | CONDITIONS VARYING | PAGES |
|---|-------------------------------------|---------------------------------|-------------------------------|
| EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK | (A) (D) (B) | MACH CONFIGURATION RUDDER | 499-540 541-547 548-554 |
| EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES | (E) (F) | CONFIGURATION ORBINC | 555-559 560-562 |
| EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER | (E) (F) | CONFIGURATION | 563-567 568-570 |

PLOTTED COEFFICIENTS SCHEDULE

(A) CLM, CN, CA, CAF, CAB VERSUS ALPHA
CLM VERSUS CN

(B) CY, CYN, CBL VERSUS BETA

(C) CLM, CN, CA VERSUS BETA

(D) CY, CYN, CBL VERSUS ALPHA

(E) D(CLM), D(CN), DCLM/DCN, CAALFO,
CAFAFO VERSUS MACH

(F) D(CY), D(CYN), D(CBL) VERSUS MACH

Notes:

1. Positive directions of force coefficients, moment coefficients, and angles are indicated by arrows.
2. For clarity, origins of wind and stability axes have been displaced from the center of gravity.

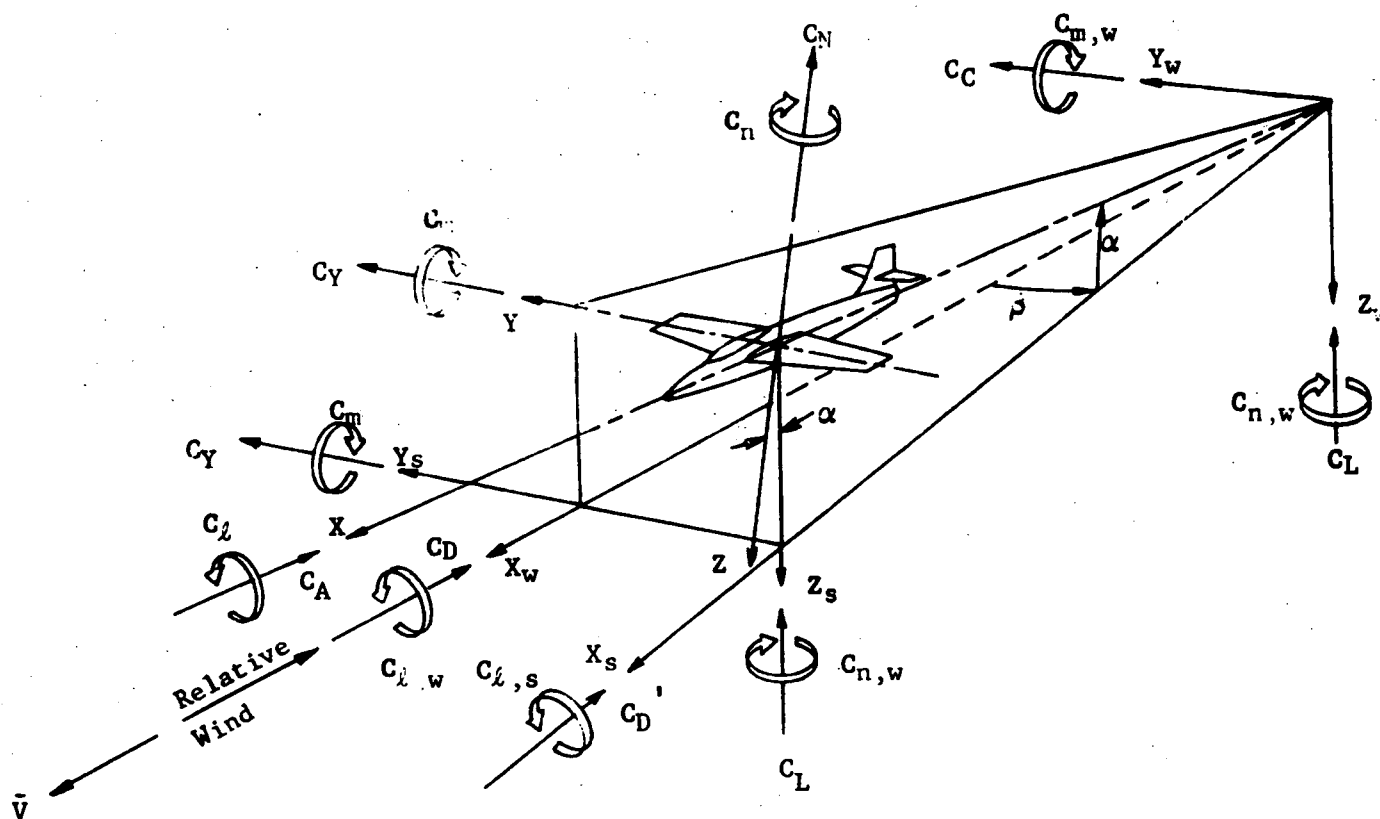


Figure 1. Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

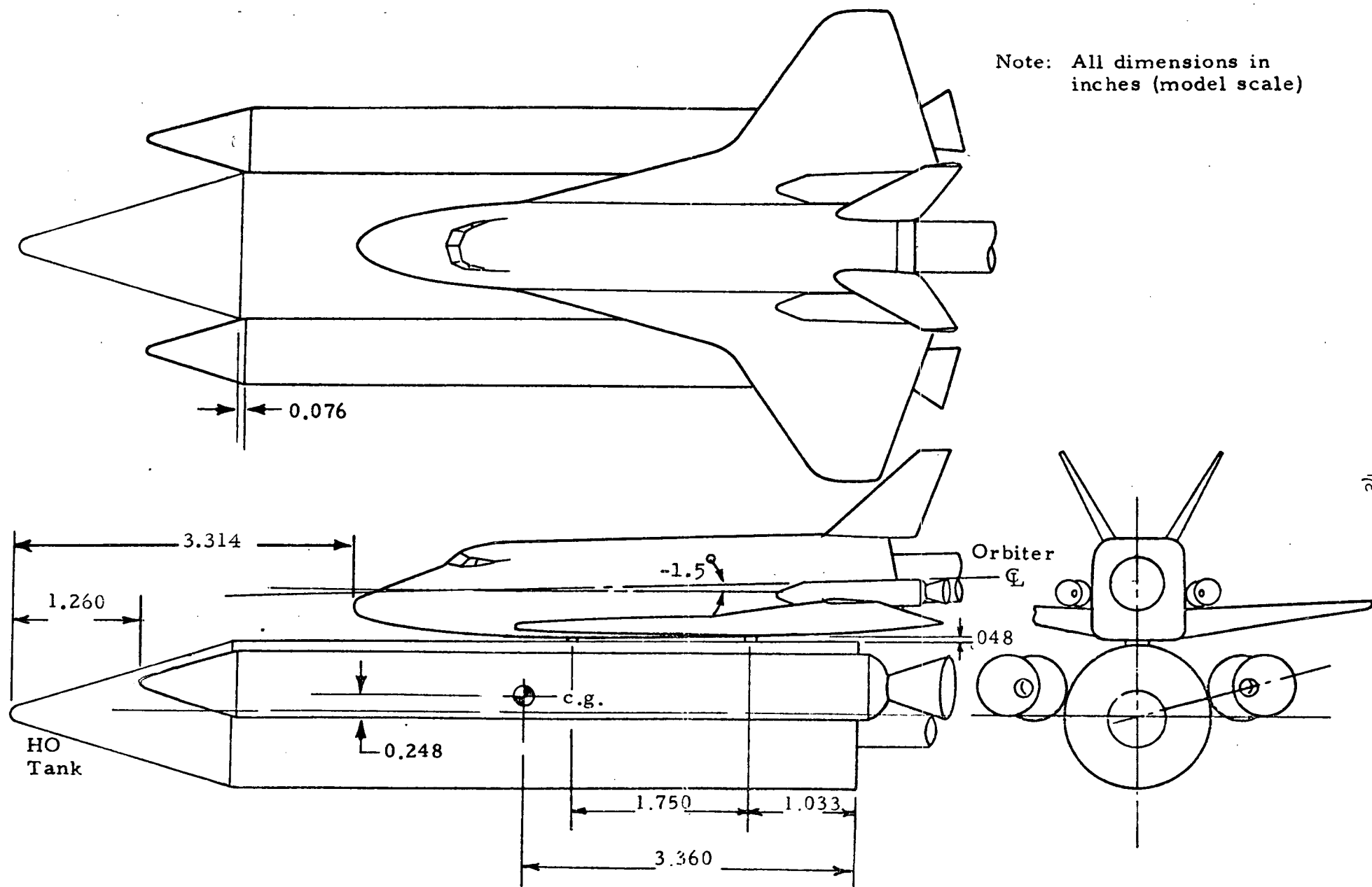


Figure 2 - Launch Vehicle T3 346 Inch HO Tank

Note: All dimensions are model scale, inches

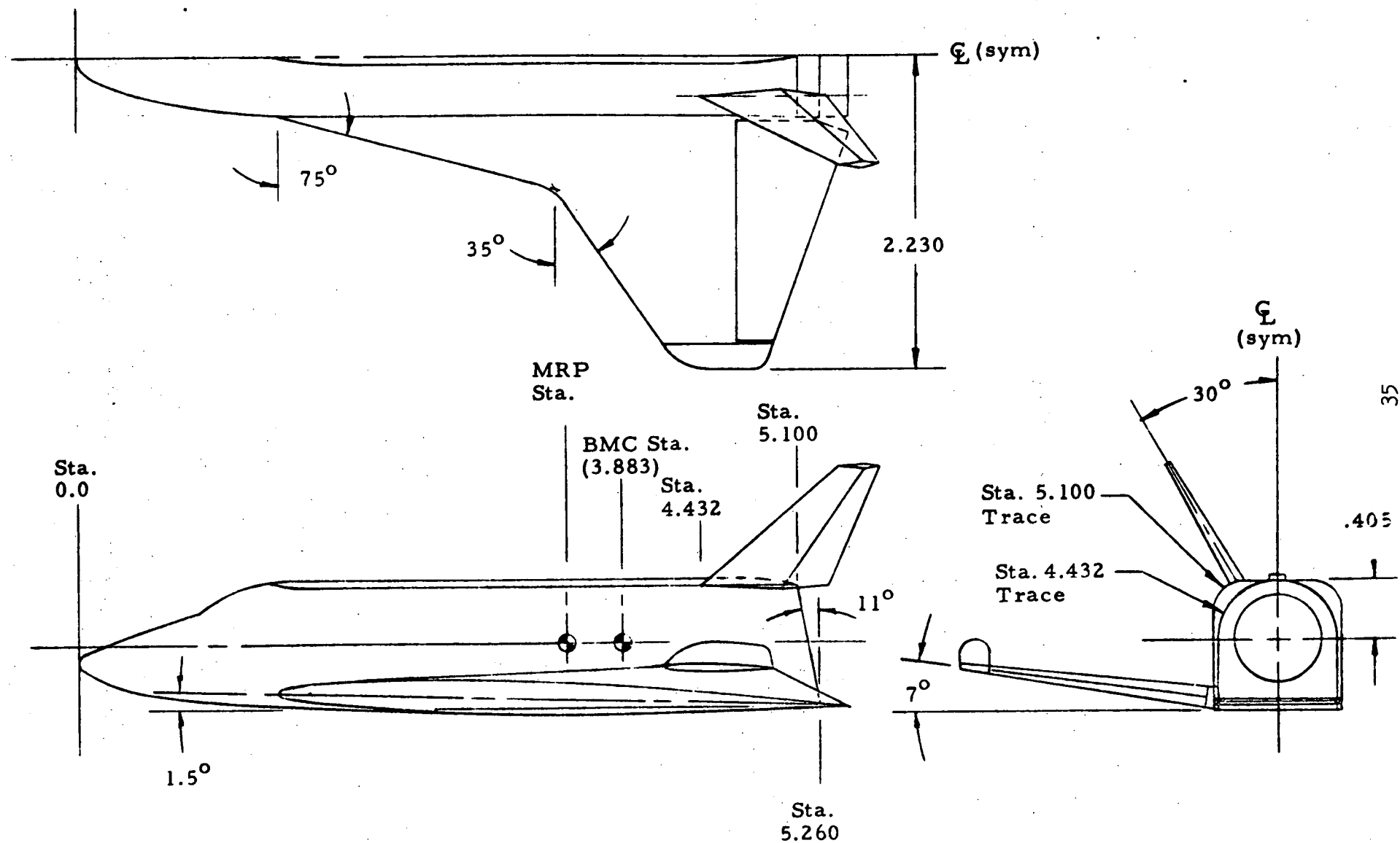


Fig. 3 - General Arrangement, Space Shuttle Orbiter

Note: All dimensions in inches (model scale)

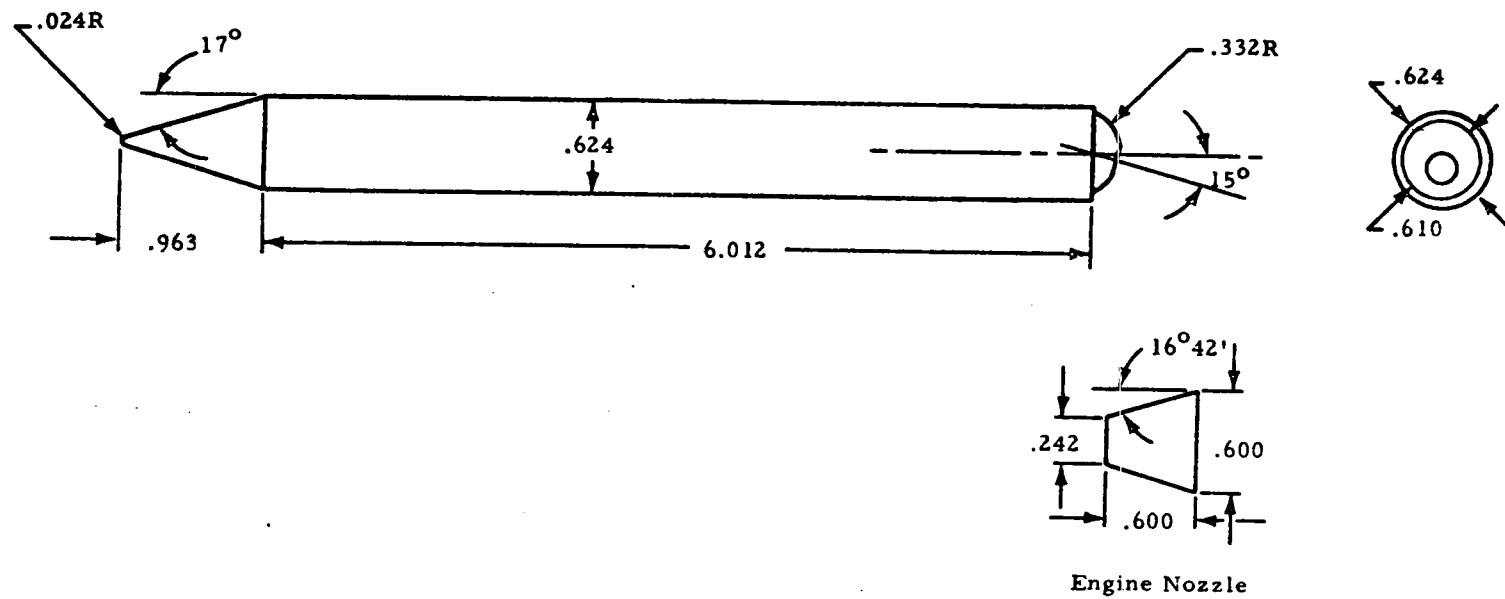


Fig. 4 - Baseline Solid Rocket Motor

NOTE: All dimensions in inches
(model scale)

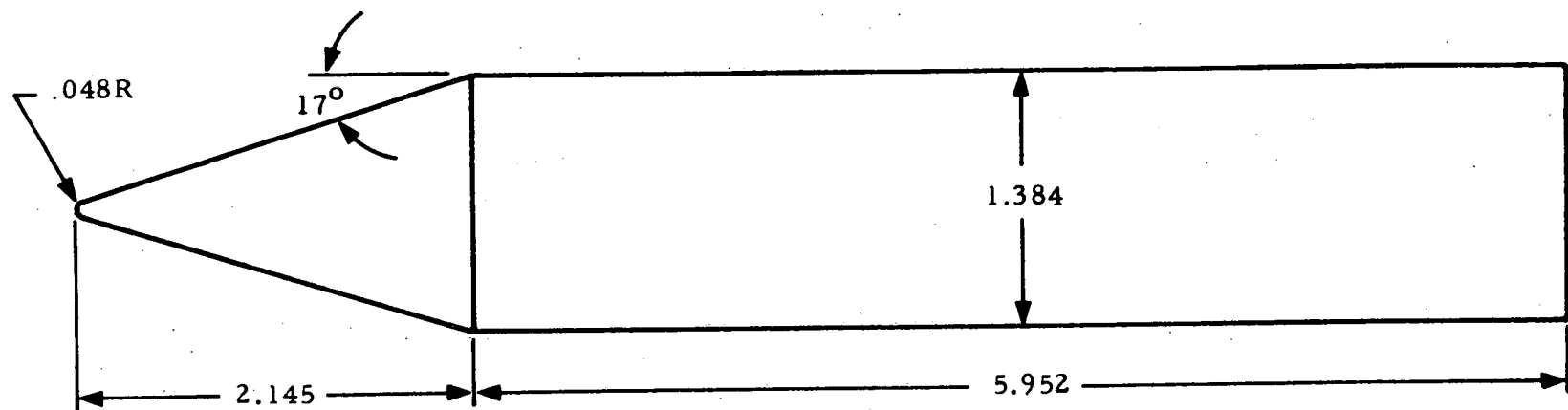


Fig. 5 - 346-Inch Diameter HO Tank with 17-Degree Nosecone

Note: All dimensions in inches

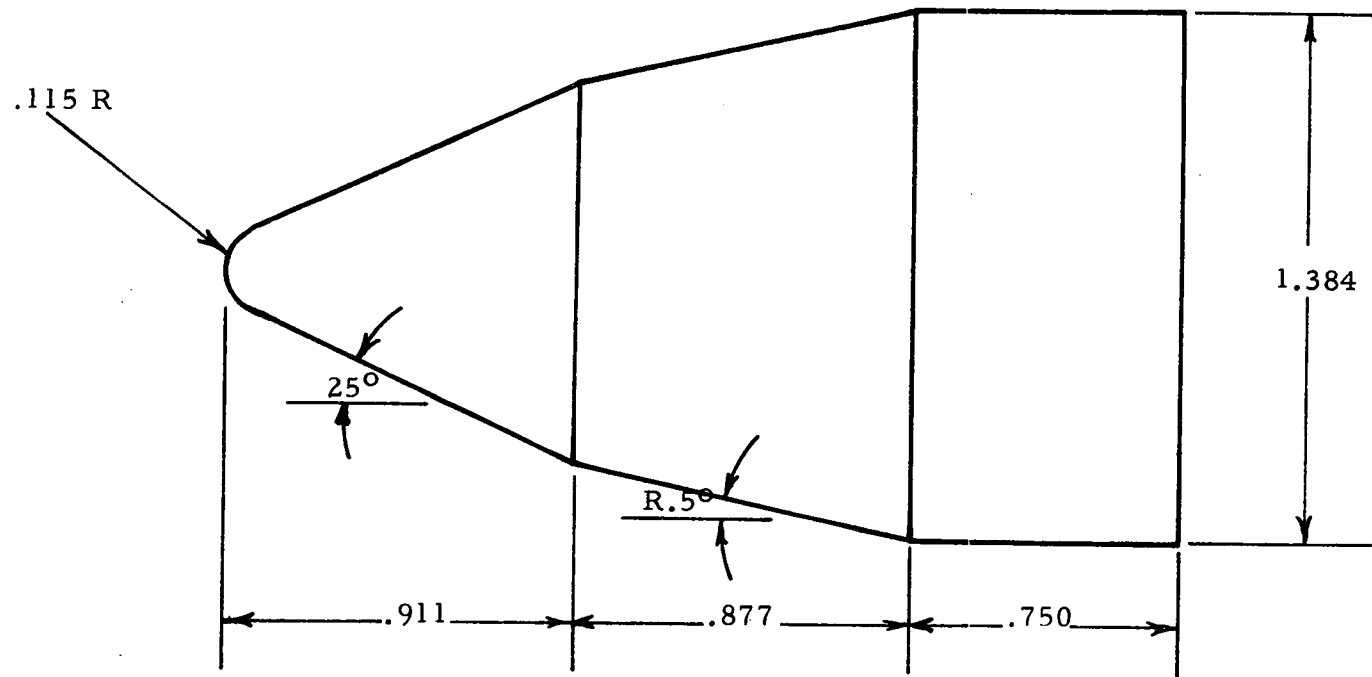
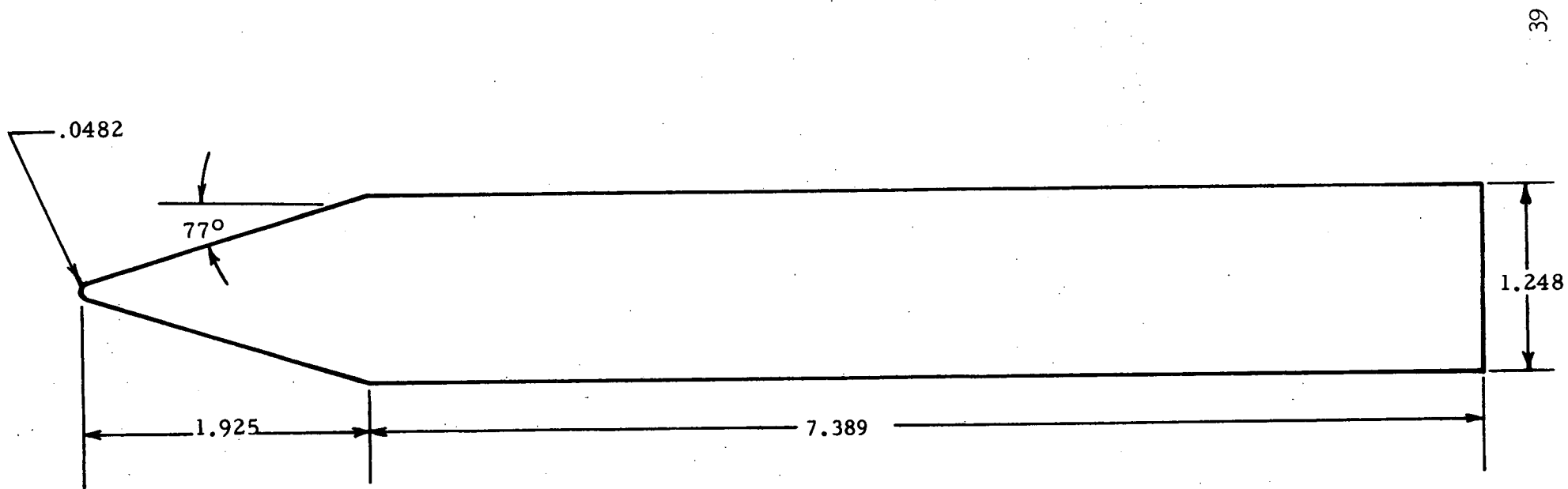
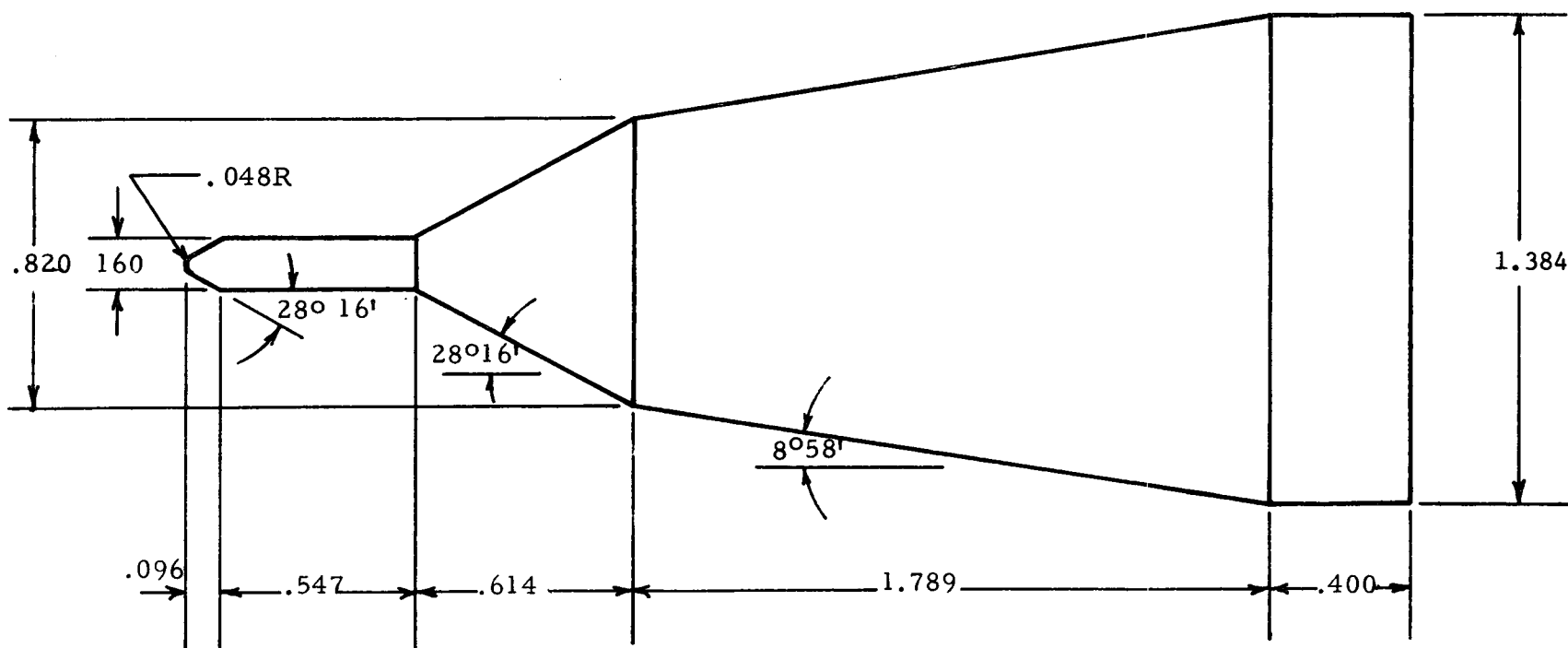


Figure 6 - T8 346 Inch HO Tank Nose Cone



Dimensions are in Inches

Figure 7 - T9, 346 Inch Diameter HO Tank



All dimensions in inches

Figure 8 - T10 346 Inch HO Tank Nose Cone

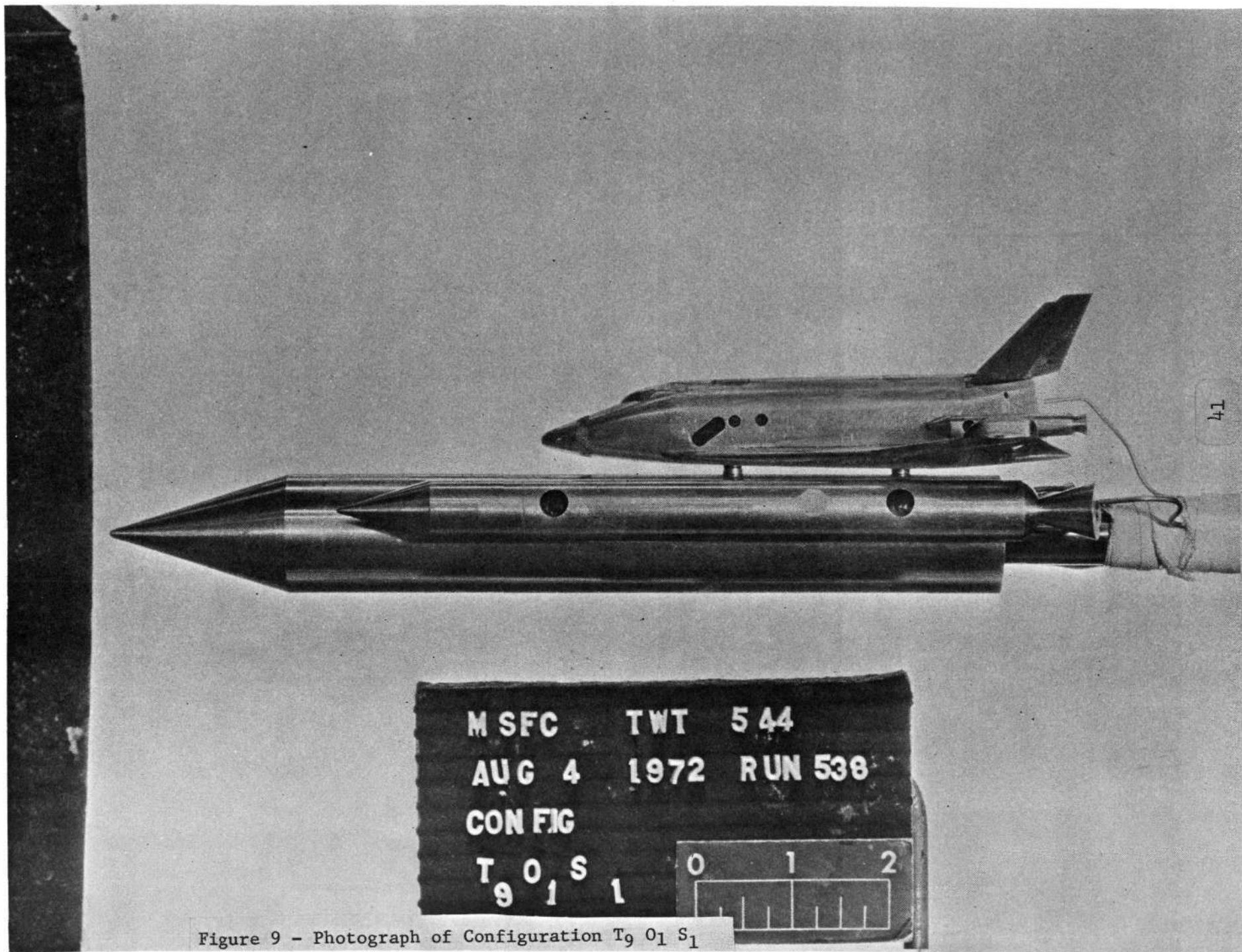


Figure 9 - Photograph of Configuration T₉ O₁ S₁

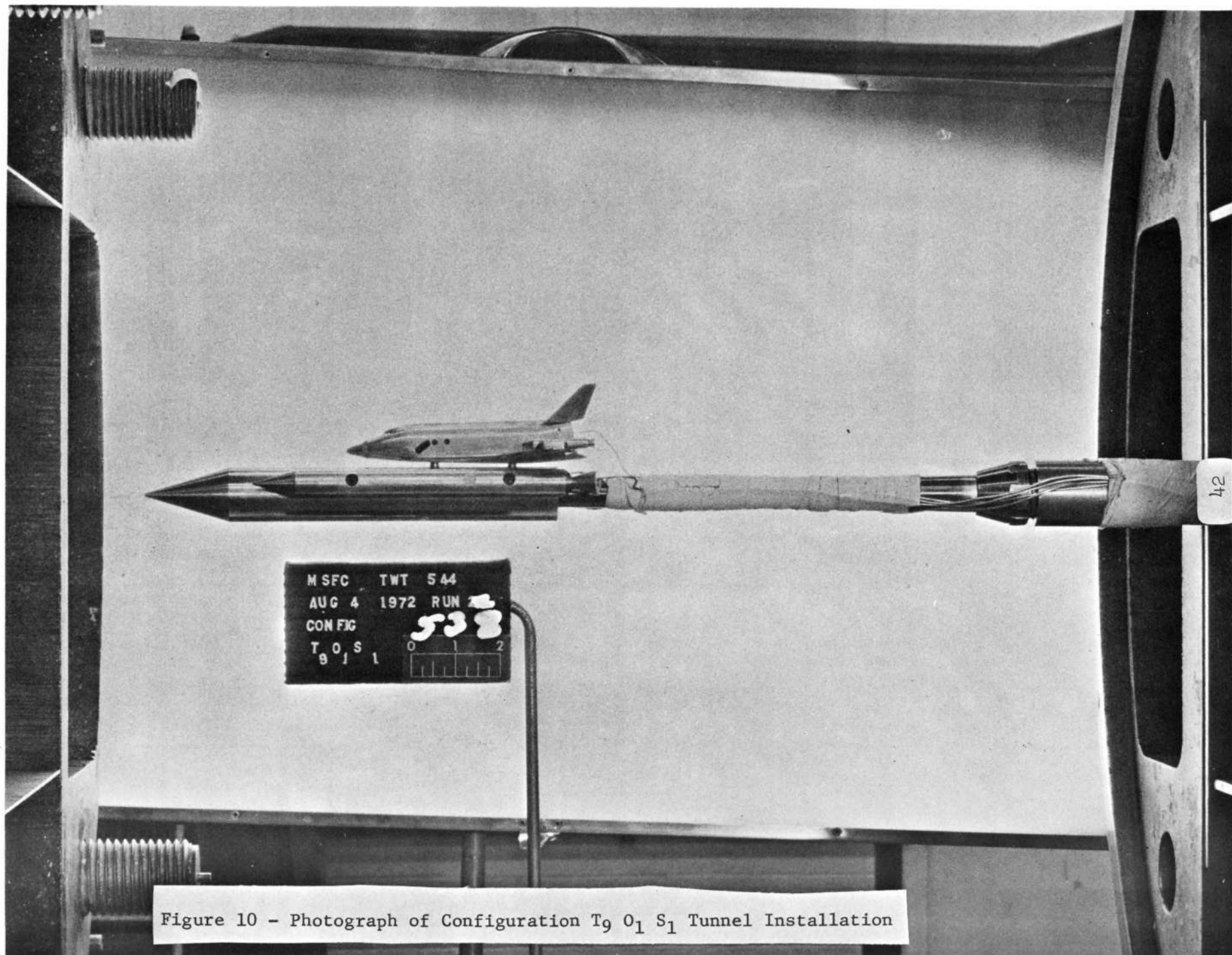
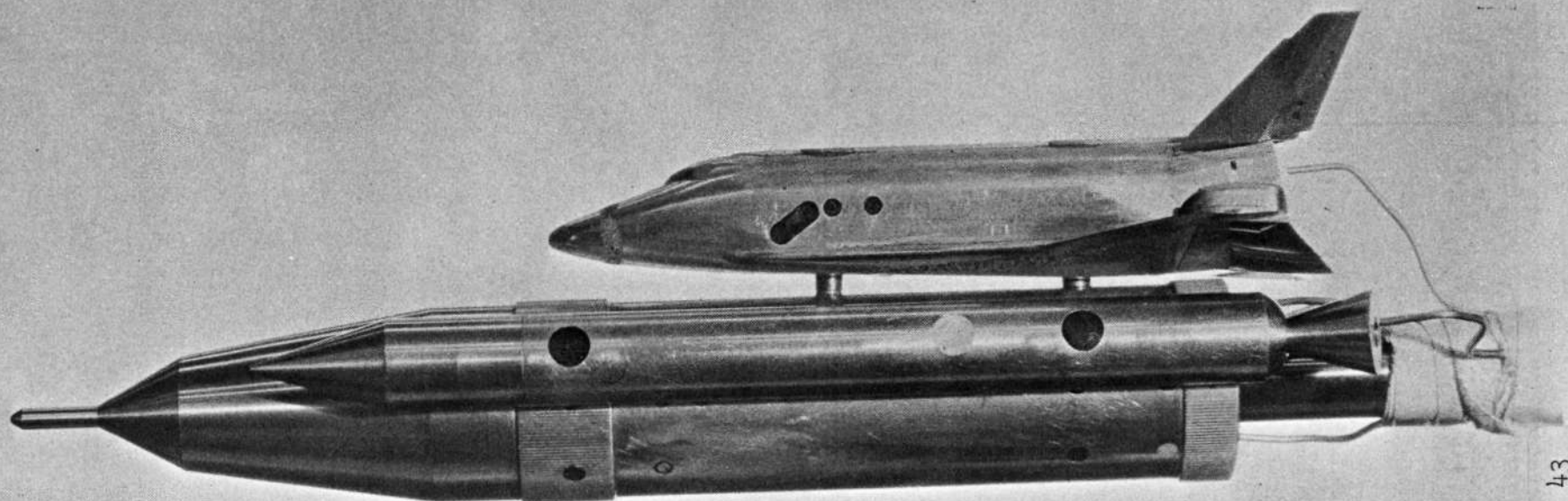


Figure 10 - Photograph of Configuration T₉ O₁ S₁ Tunnel Installation



43

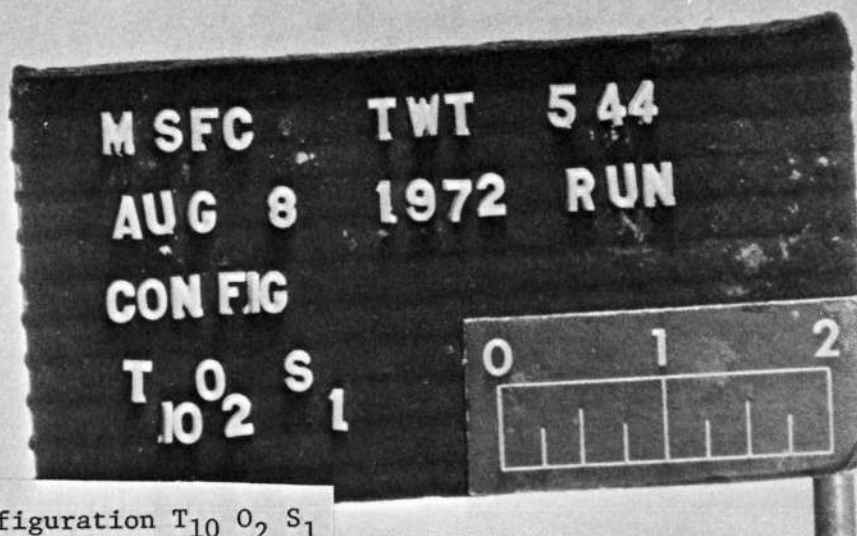


Figure 11 - Photograph of Configuration $T_{10} O_2 S_1$

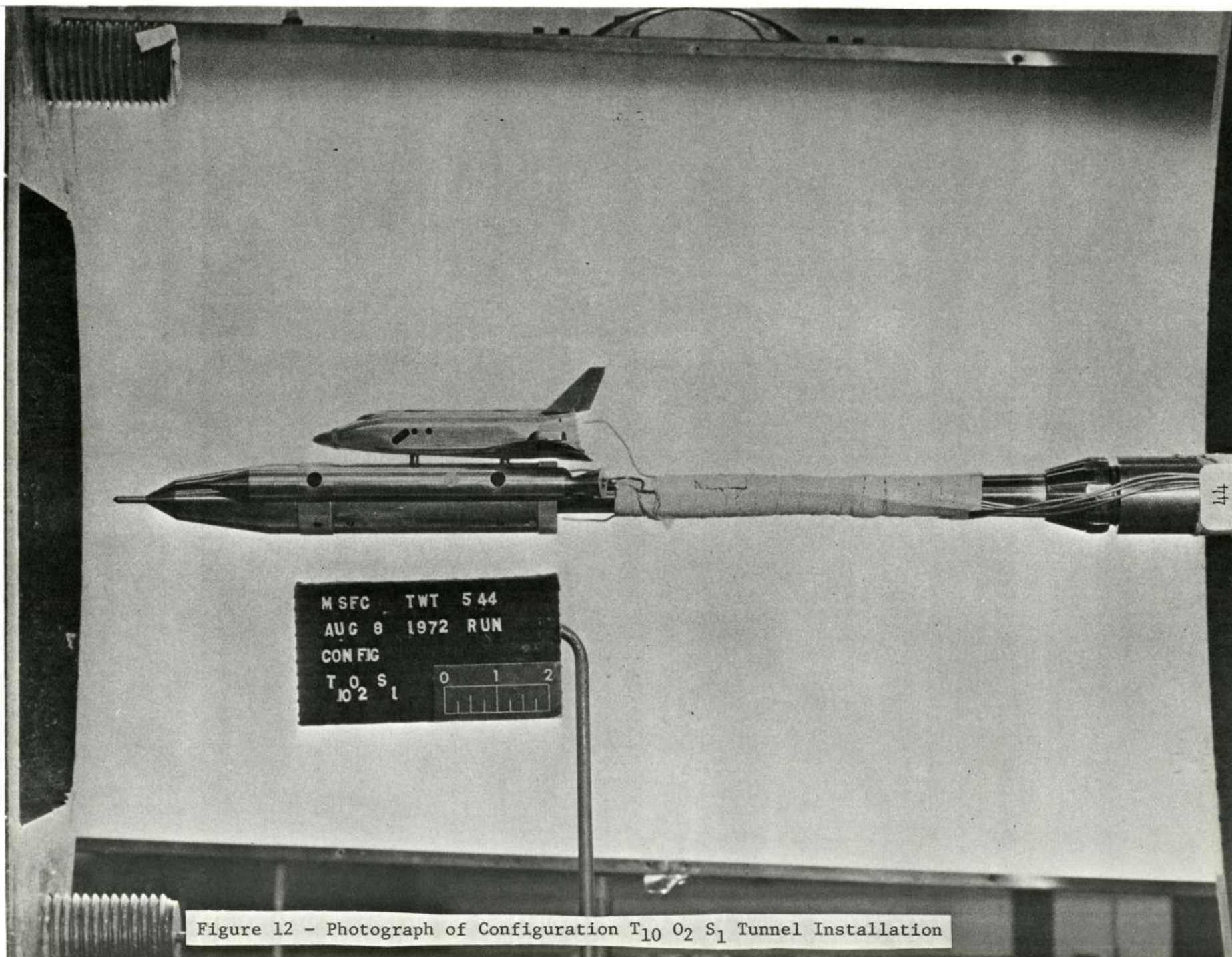


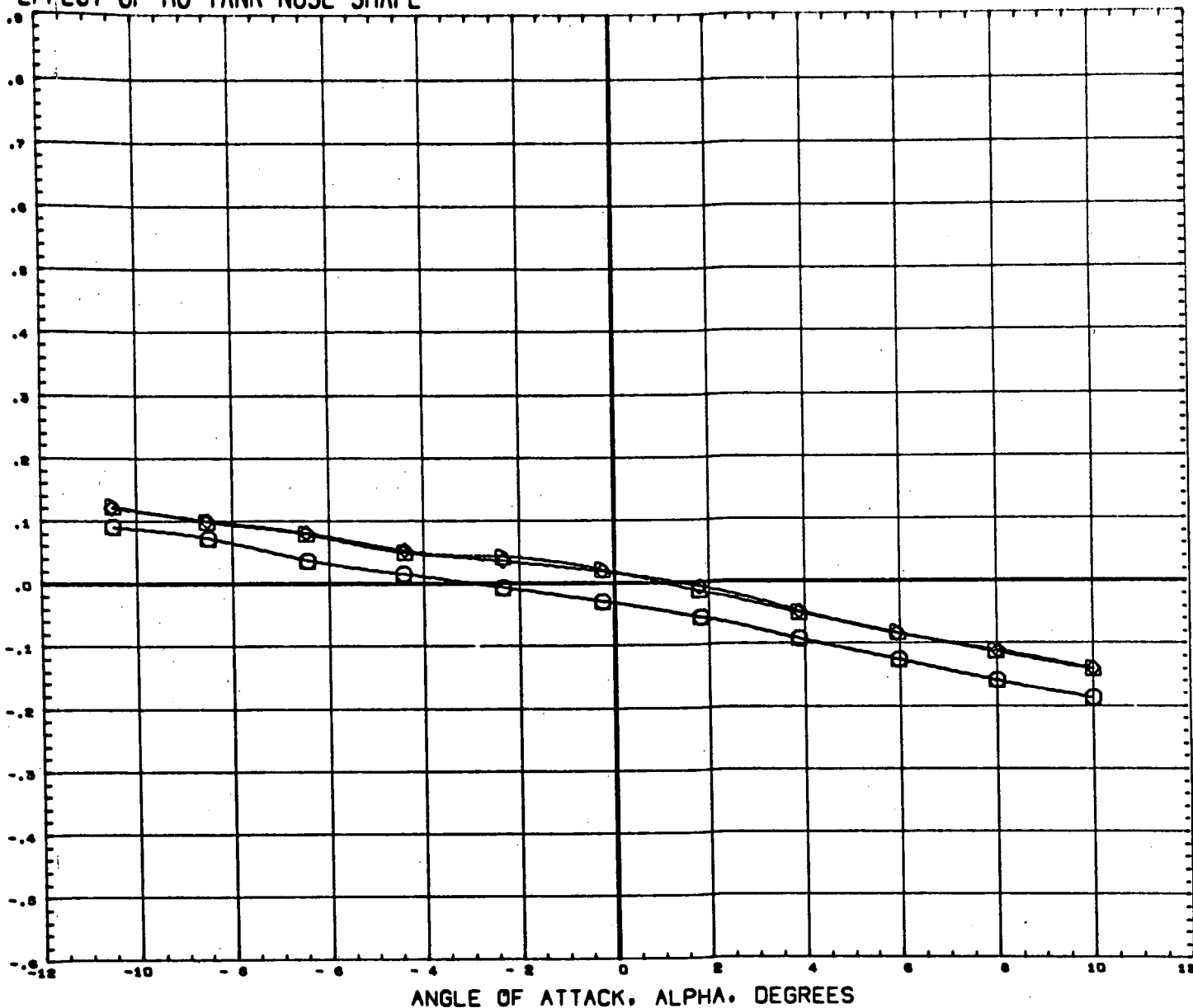
Figure 12 - Photograph of Configuration T₁₀ O₂ S₁ Tunnel Installation

D A T A F I G U R E S

Tabulations of the plotted data and corresponding
source data are available from SADSAC Operations.

EFFECT OF H0 TANK NOSE SHAPE

PITCHING MOMENT COEFFICIENT, CLM



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

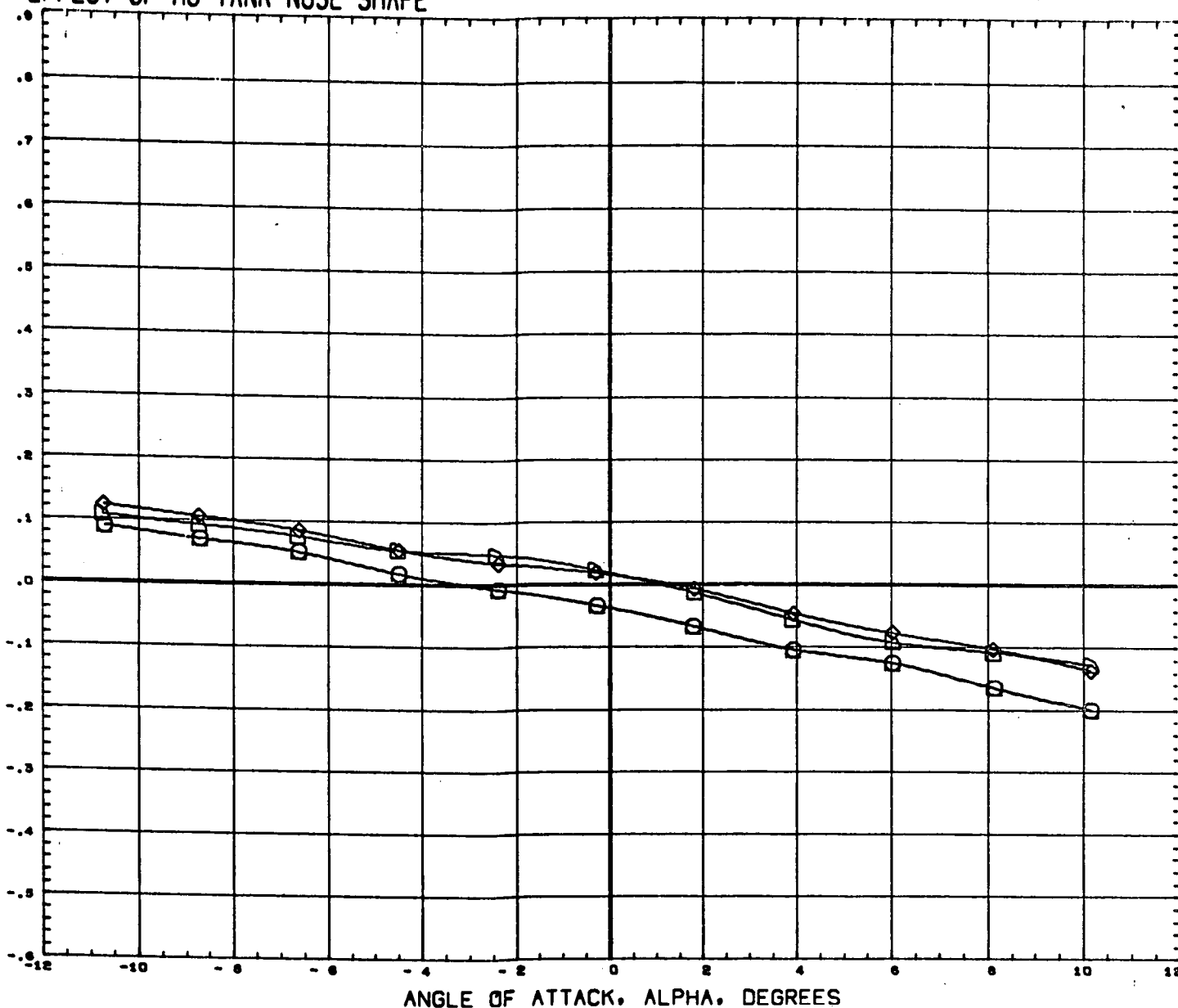
.60

PAGE

1

EFFECT OF HO TANK NOSE SHAPE

PITCHING MOMENT COEFFICIENT, CLM



ANGLE OF ATTACK, ALPHA, DEGREES

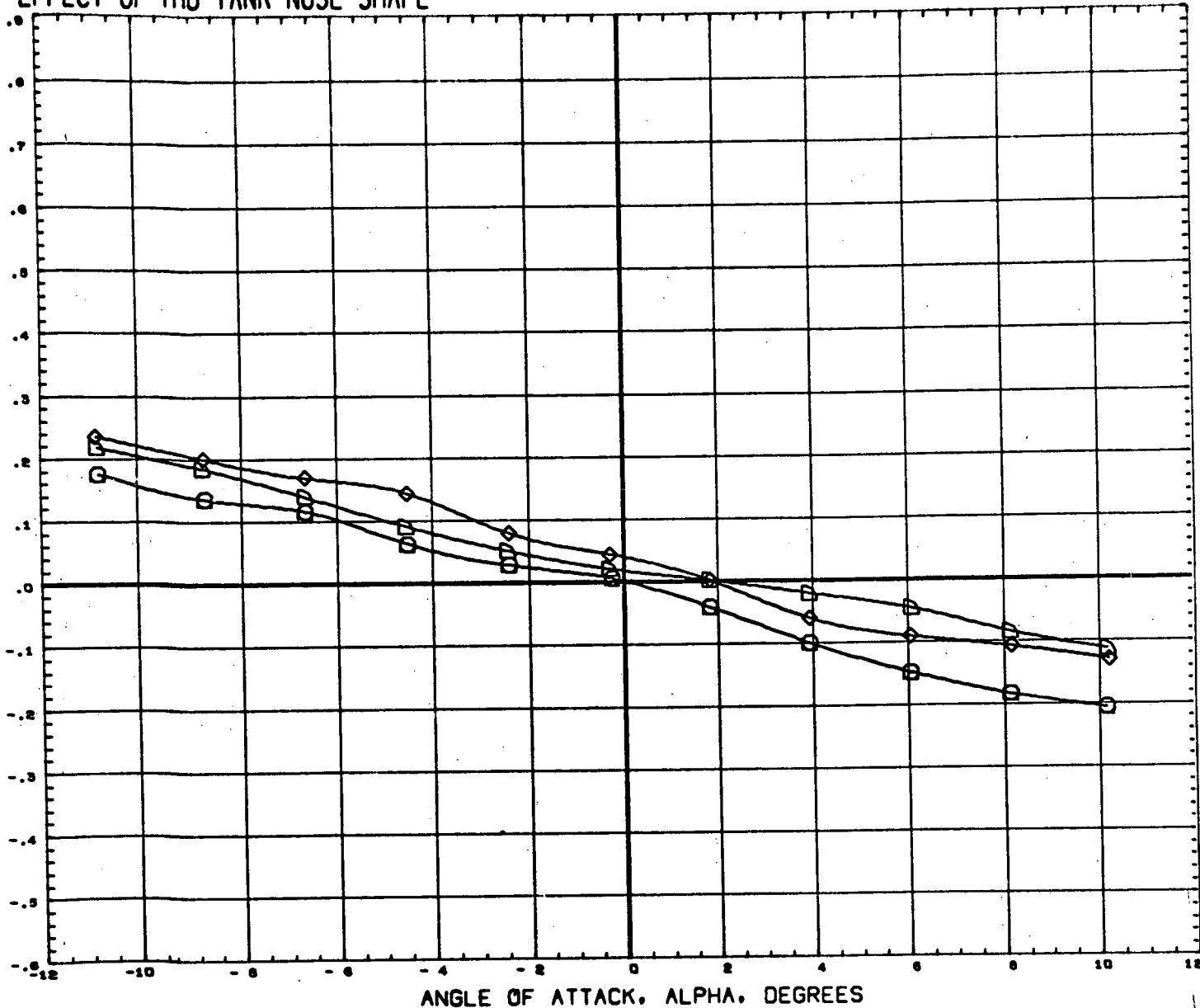
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|--|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 30. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 | IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRF | 0.0000 | IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRF | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH .80

PAGE 2

EFFECT OF HHO TANK NOSE SHAPE

PITCHING MOMENT COEFFICIENT, CLM



DATA SET SYMBOL CONFIGURATION DESCRIPTION

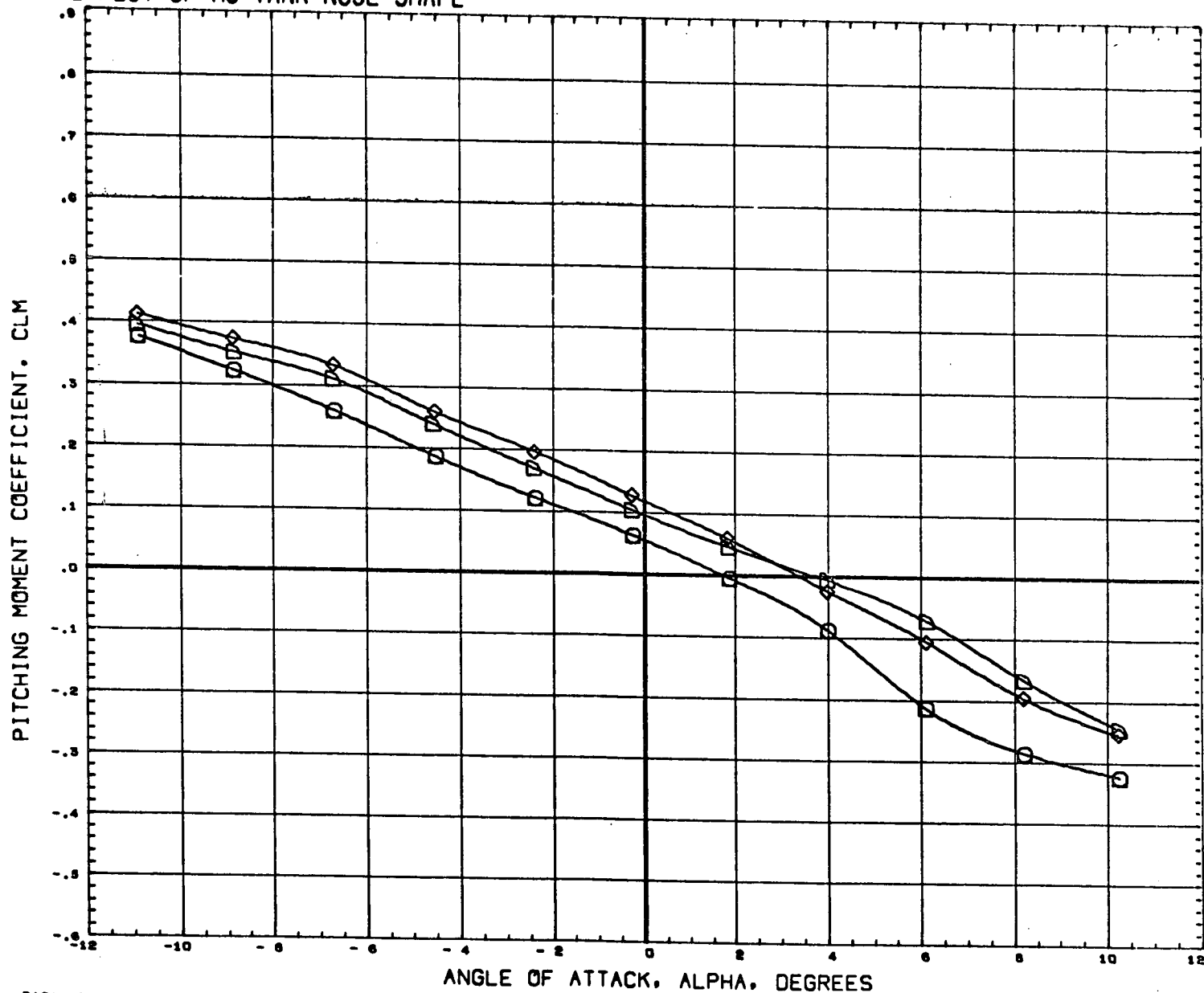
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|----------|--|---------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 |
| (B71091) | DATA: NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T801S1 |
| (B71123) | DATA: NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71125) | DATA: NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T1001S1 |

| ORINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|--------|-------|--------|--------|-----------------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| -1.500 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| -1.500 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| -1.500 | 0.023 | 0.000 | 0.000 | YMRP 0.0000 IN. |
| -1.500 | 0.023 | 0.000 | 0.000 | ZMRP 0.2480 IN. |
| | | | | SCALE 0.0040 SCALE |

MACH .90

PAGE 3

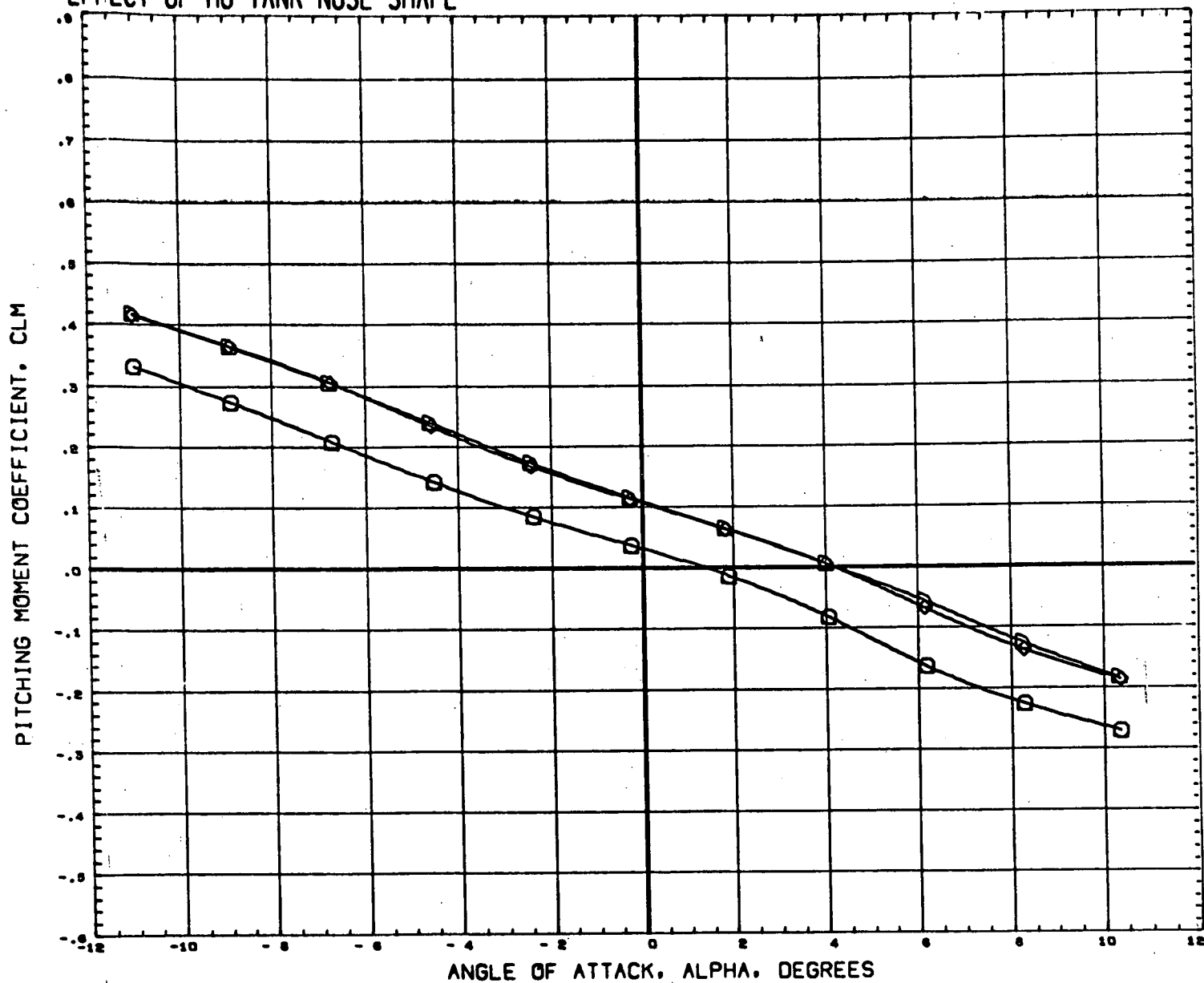
EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBN | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871051) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T601S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

EFFECT OF NO TANK NOSE SHAPE

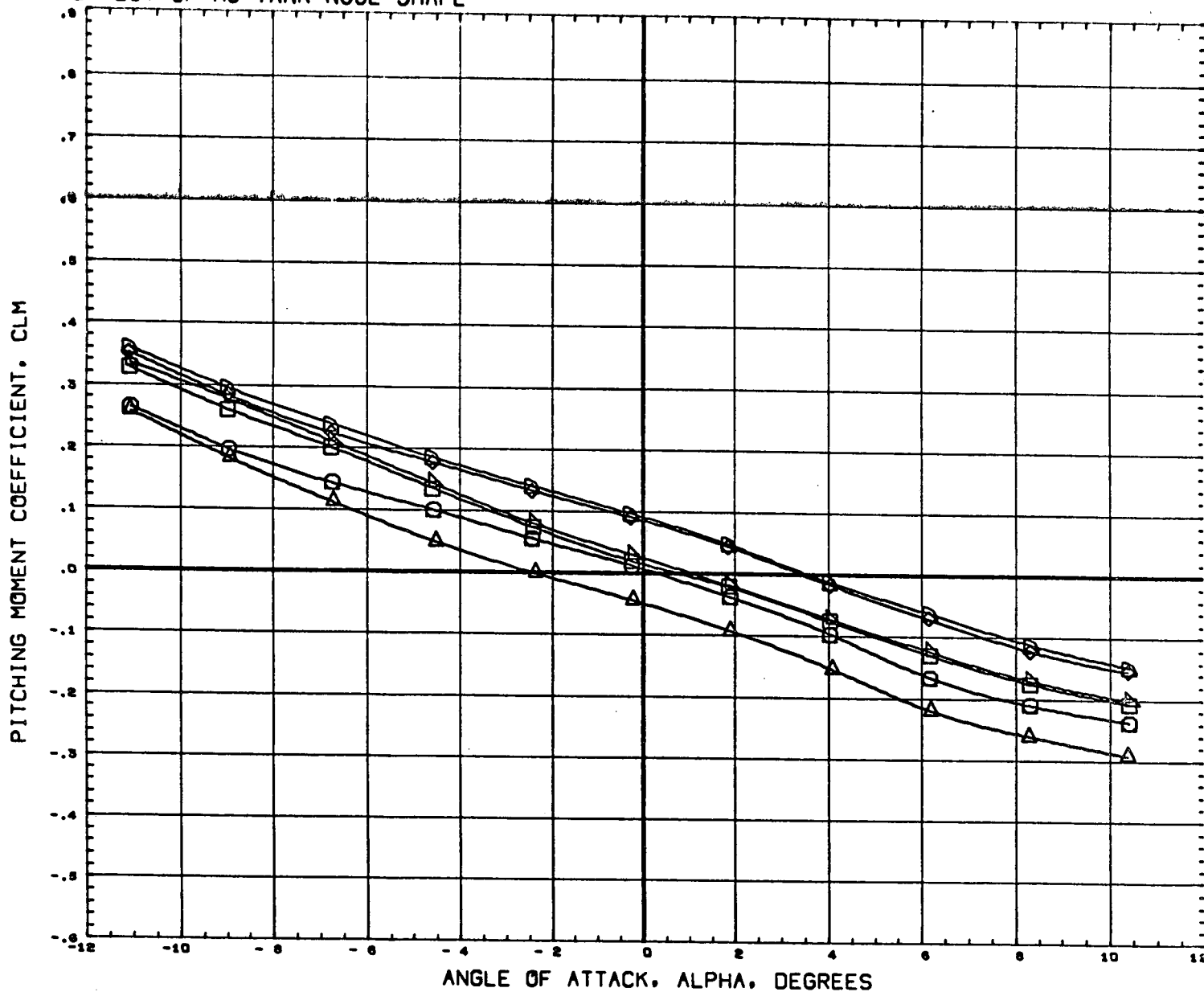


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRF | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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EFFECT OF HO TANK NOSE SHAPE

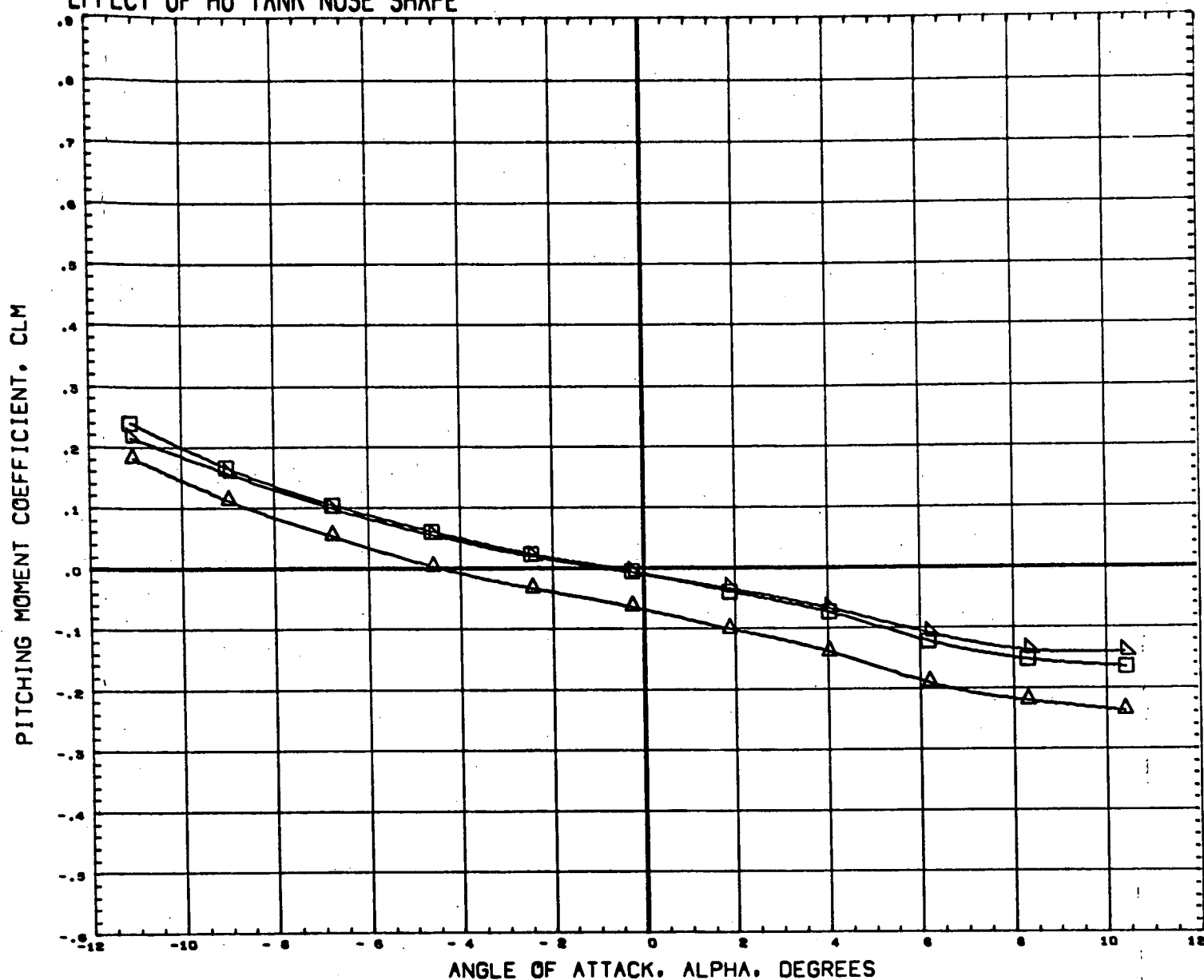


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|--|--------|-------|--------|--------|-----------------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH 1.20

PAGE 6

EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T80231 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T100231 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

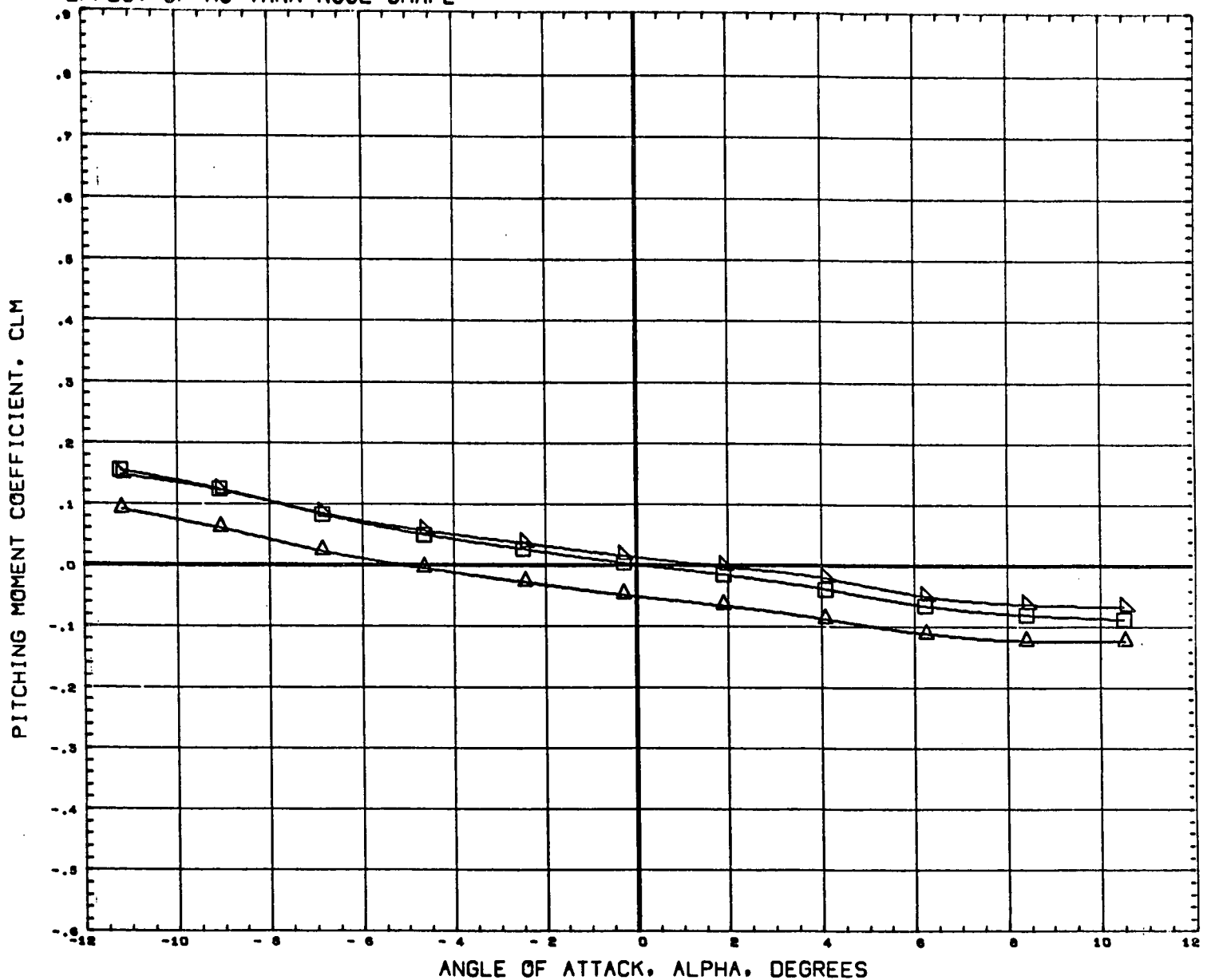
MACH

1.46

PAGE

7

EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|--|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH

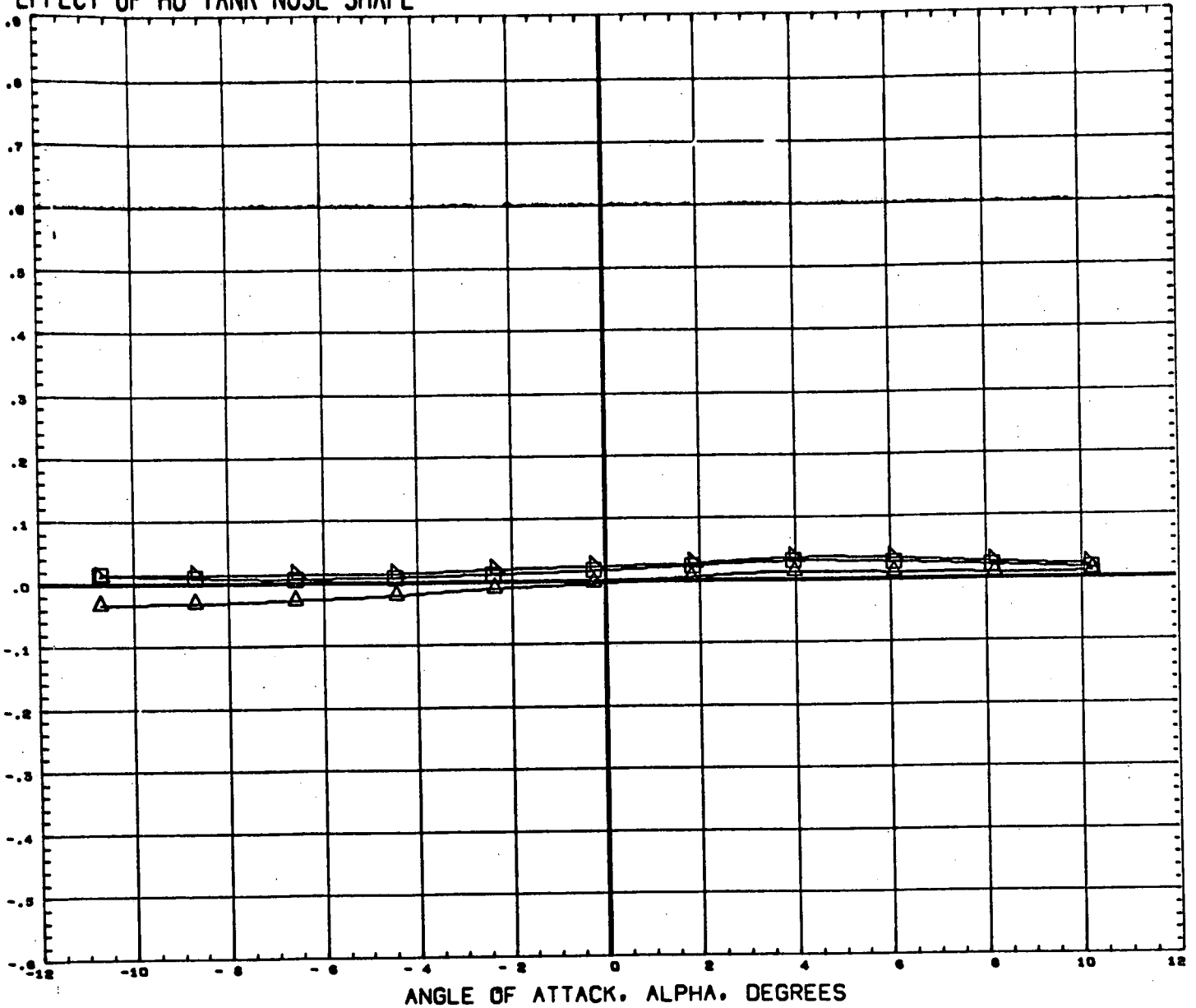
1.95

PAGE

8

EFFECT OF HO TANK NOSE SHAPE

PITCHING MOMENT COEFFICIENT, CLM



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T602S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMHP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMHP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMHP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

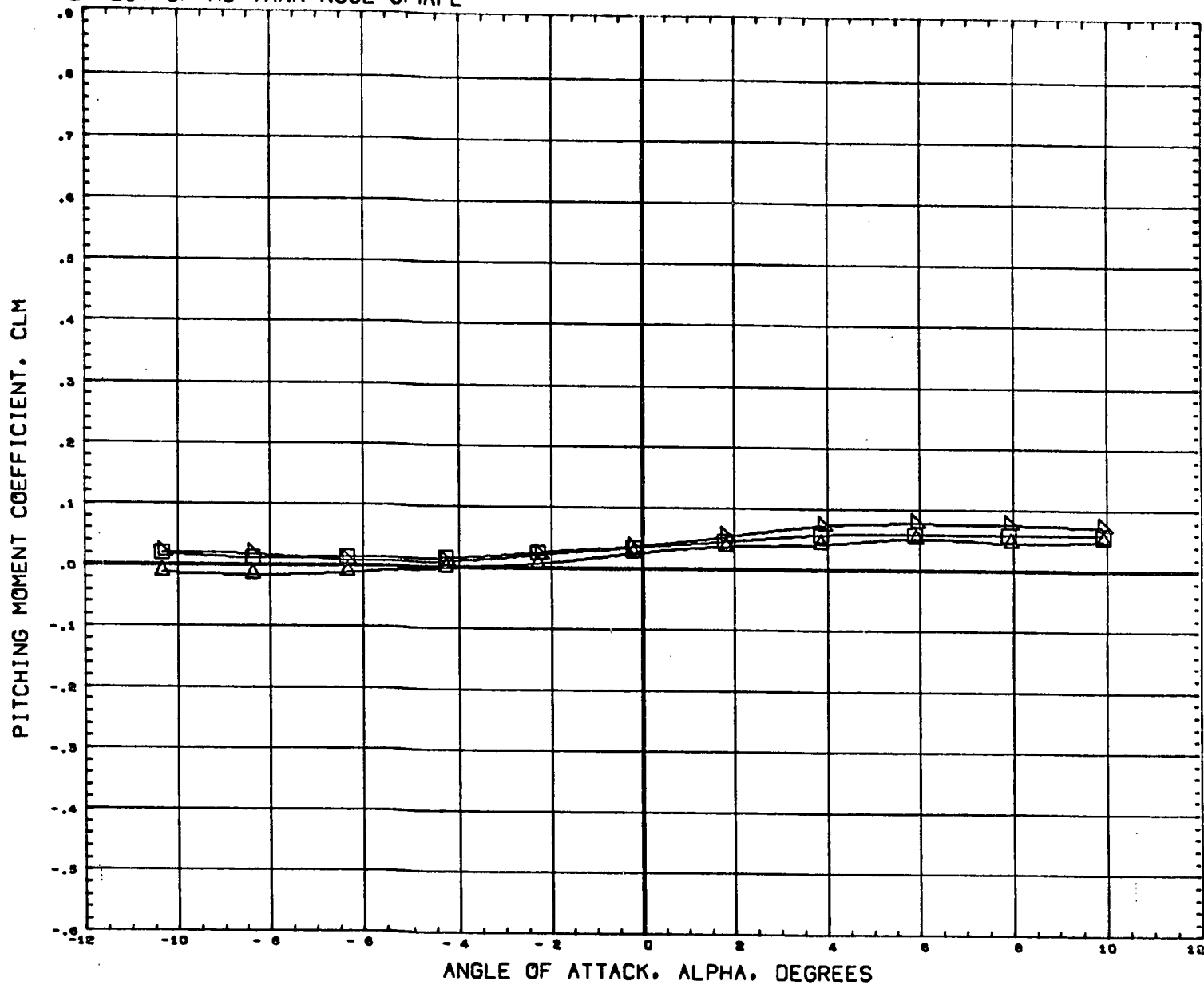
MACH

3.48

PAGE

9

EFFECT OF HO TANK NOSE SHAPE

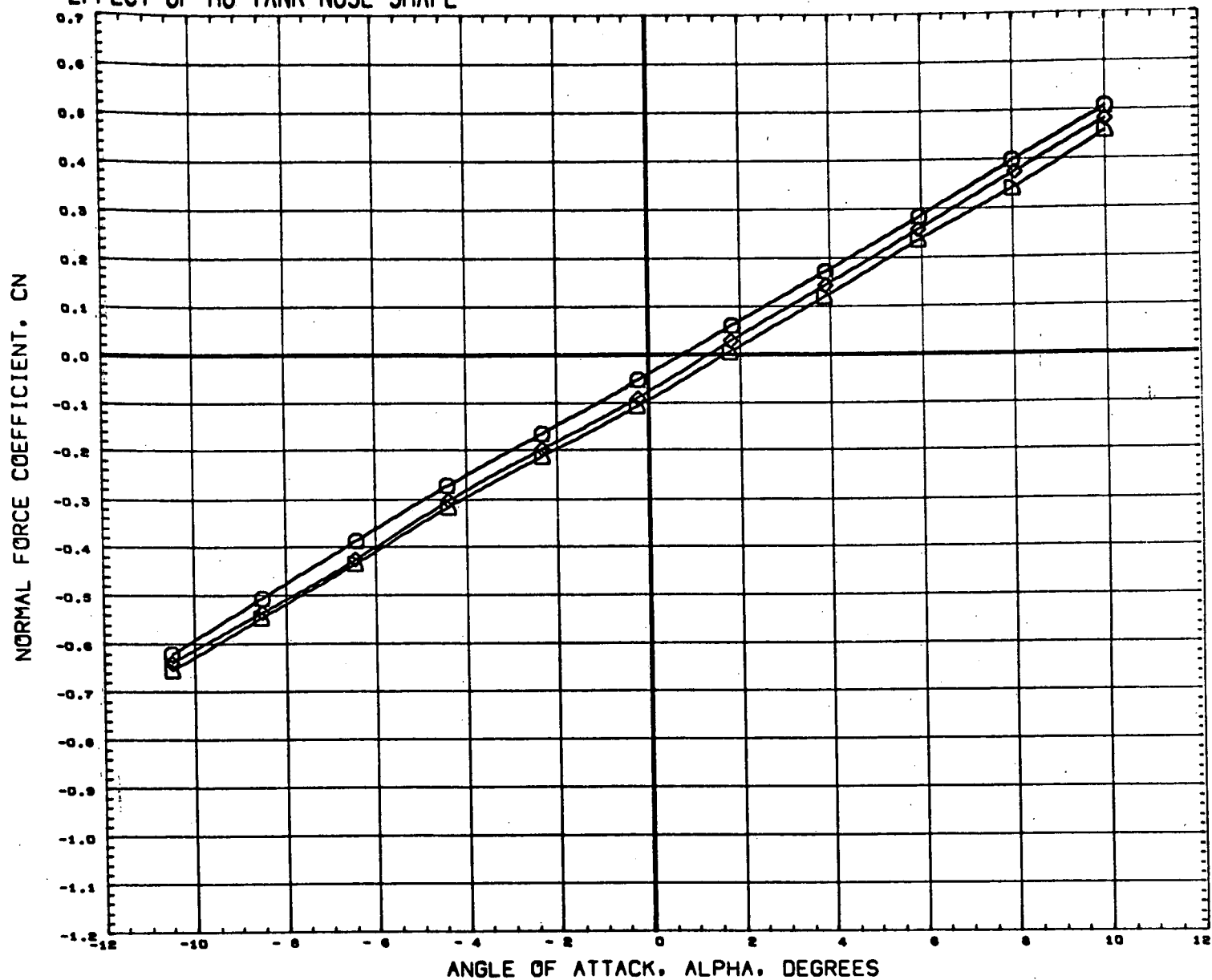


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF HO TANK NOSE SHAPE

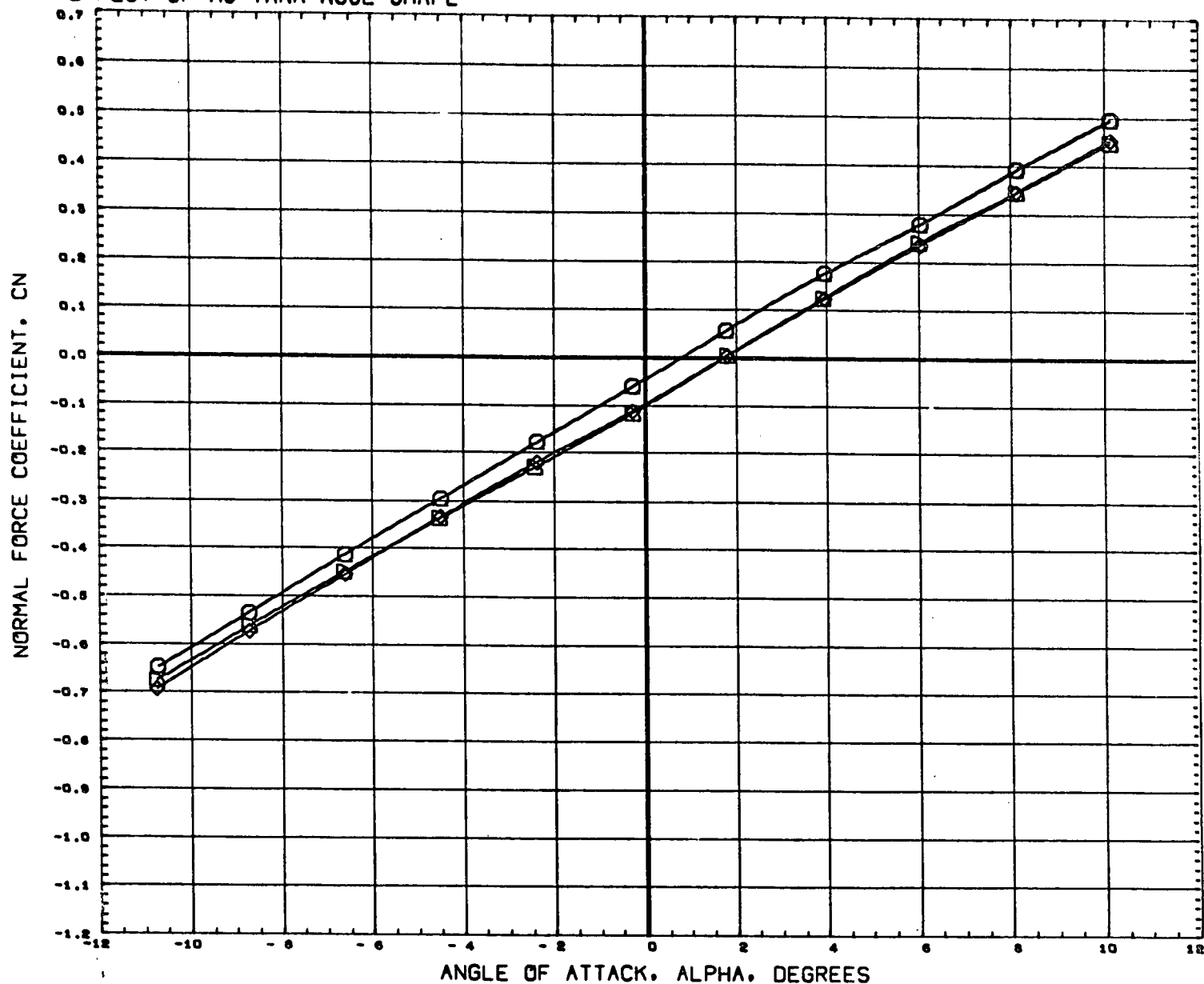


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORIGIN | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|--|--------|-------|--------|--------|-----------------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ.IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH .60

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EFFECT OF HO TANK NOSE SHAPE

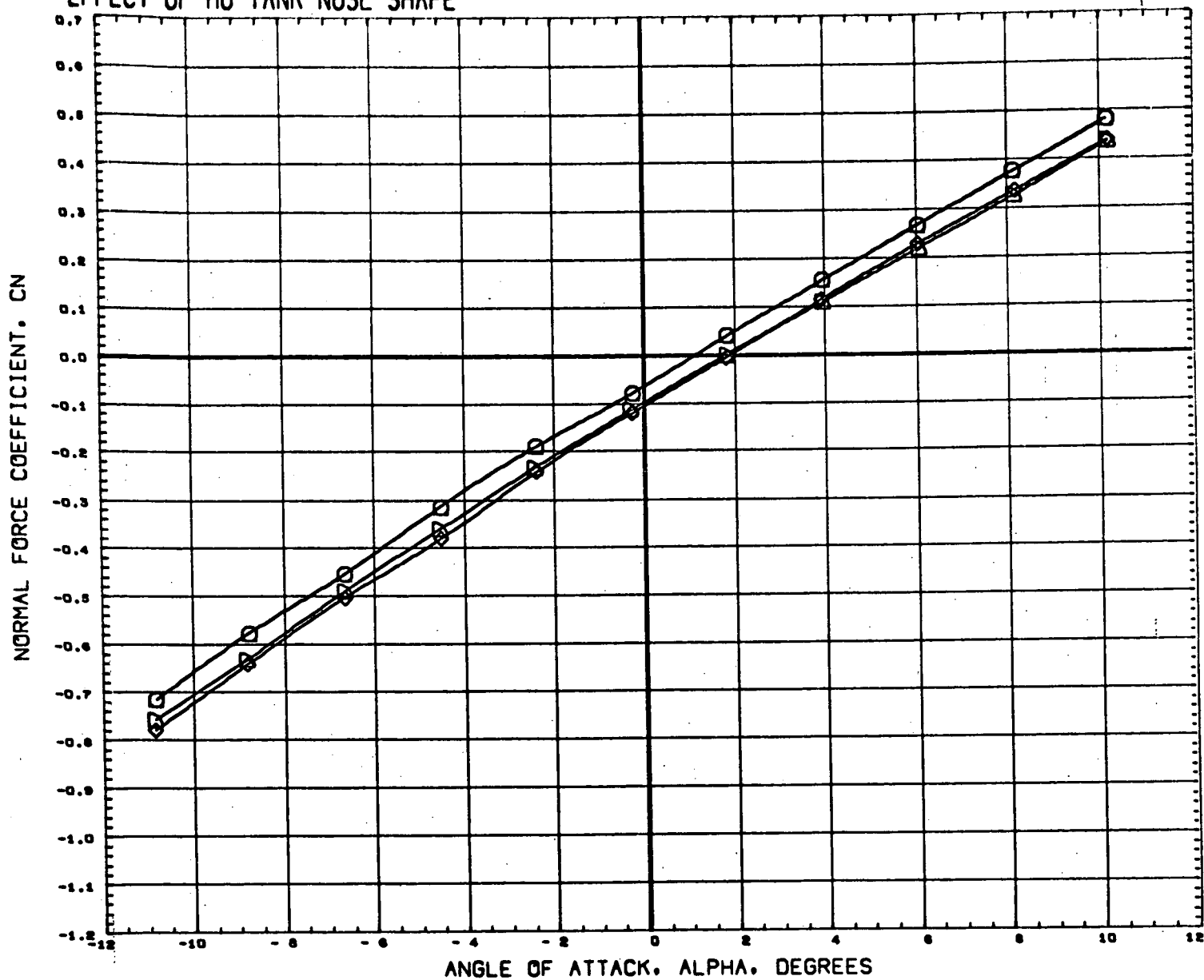


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|--|--------|-------|--------|--------|-----------------------|--------|--------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 30.1N. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 | IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRF | 0.0000 | IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRF | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH .80

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EFFECT OF HO TANK NOSE SHAPE

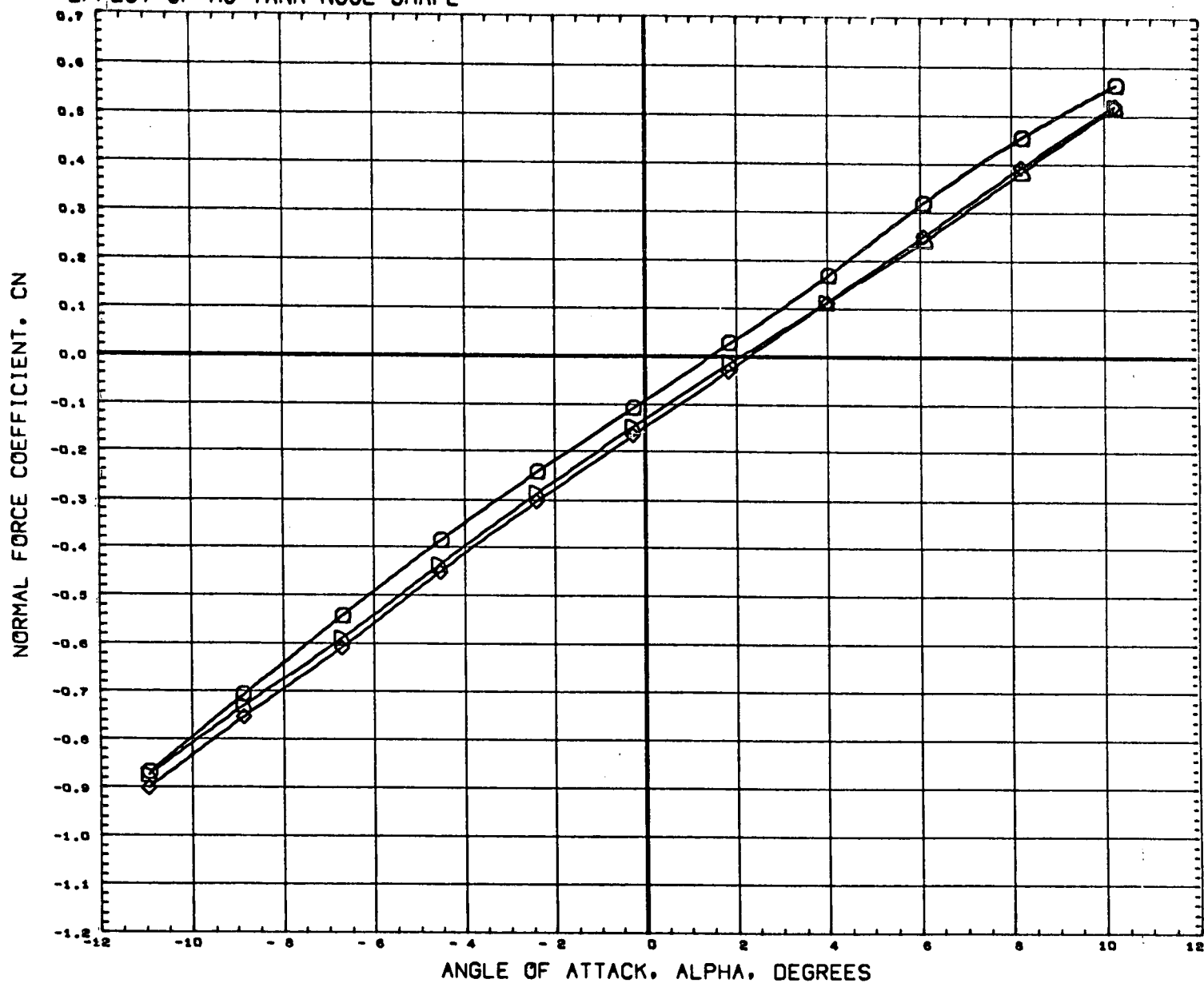


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF H0 TANK NOSE SHAPE

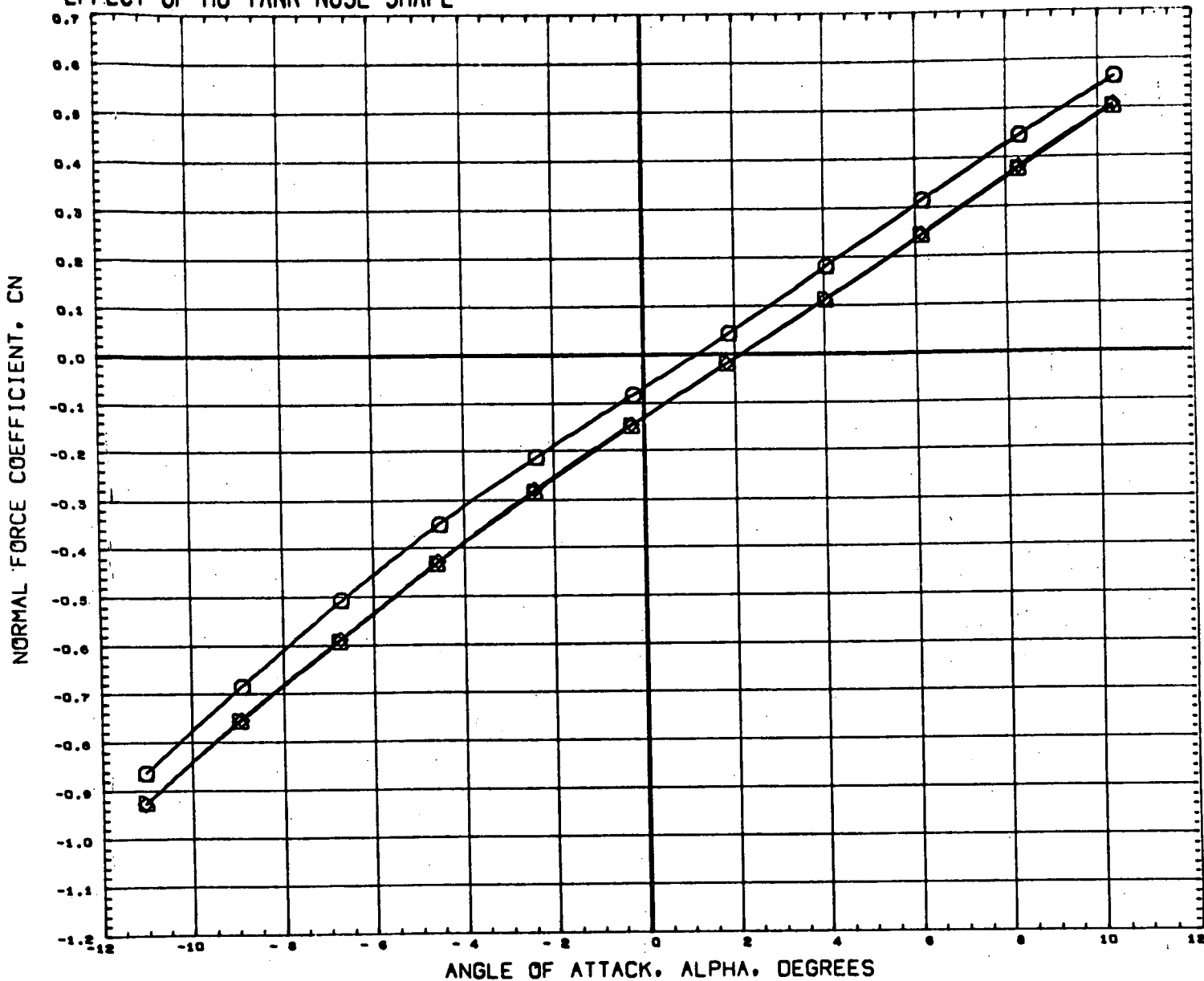


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF NO TANK NOSE SHAPE

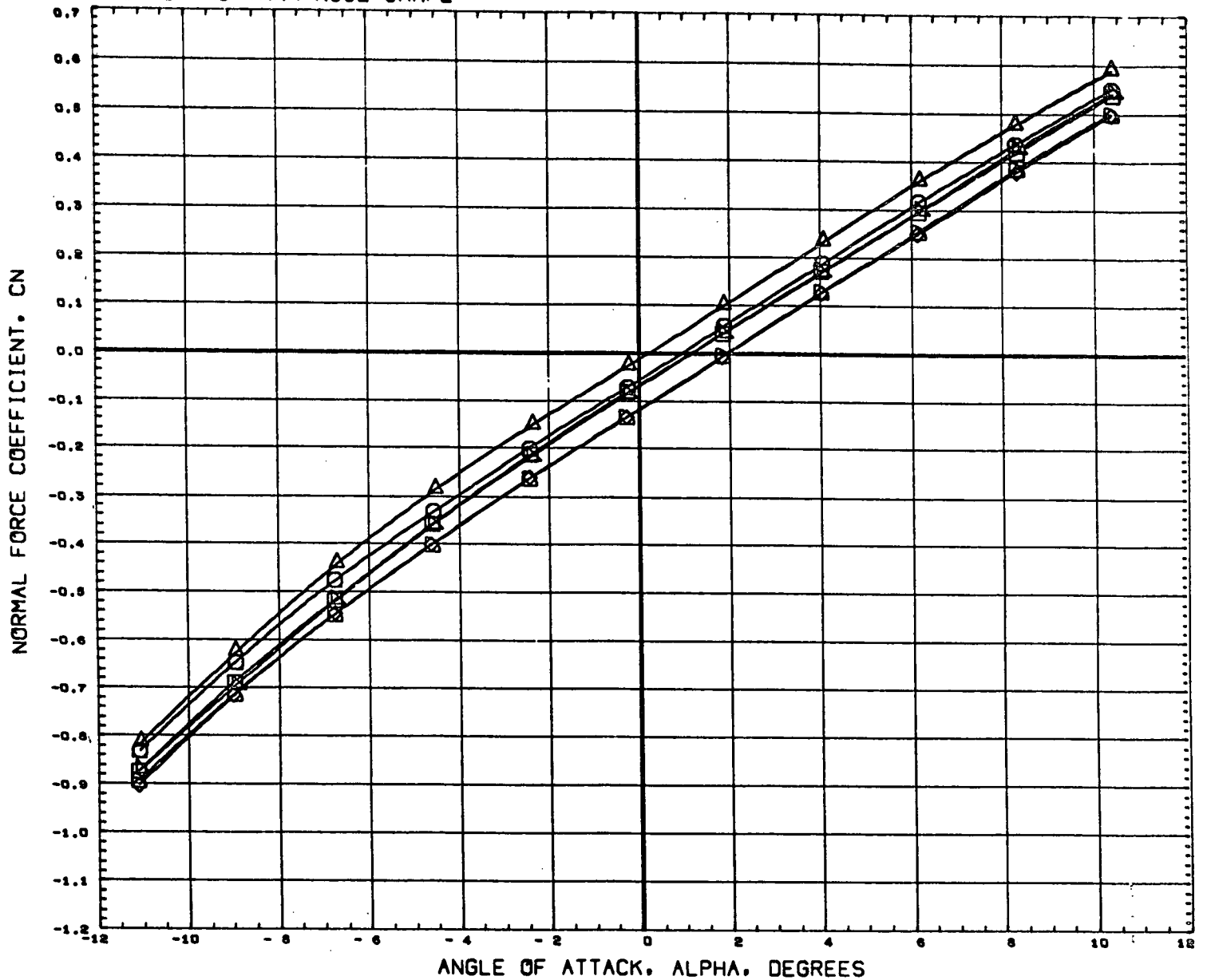


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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EFFECT OF HO TANK NOSE SHAPE

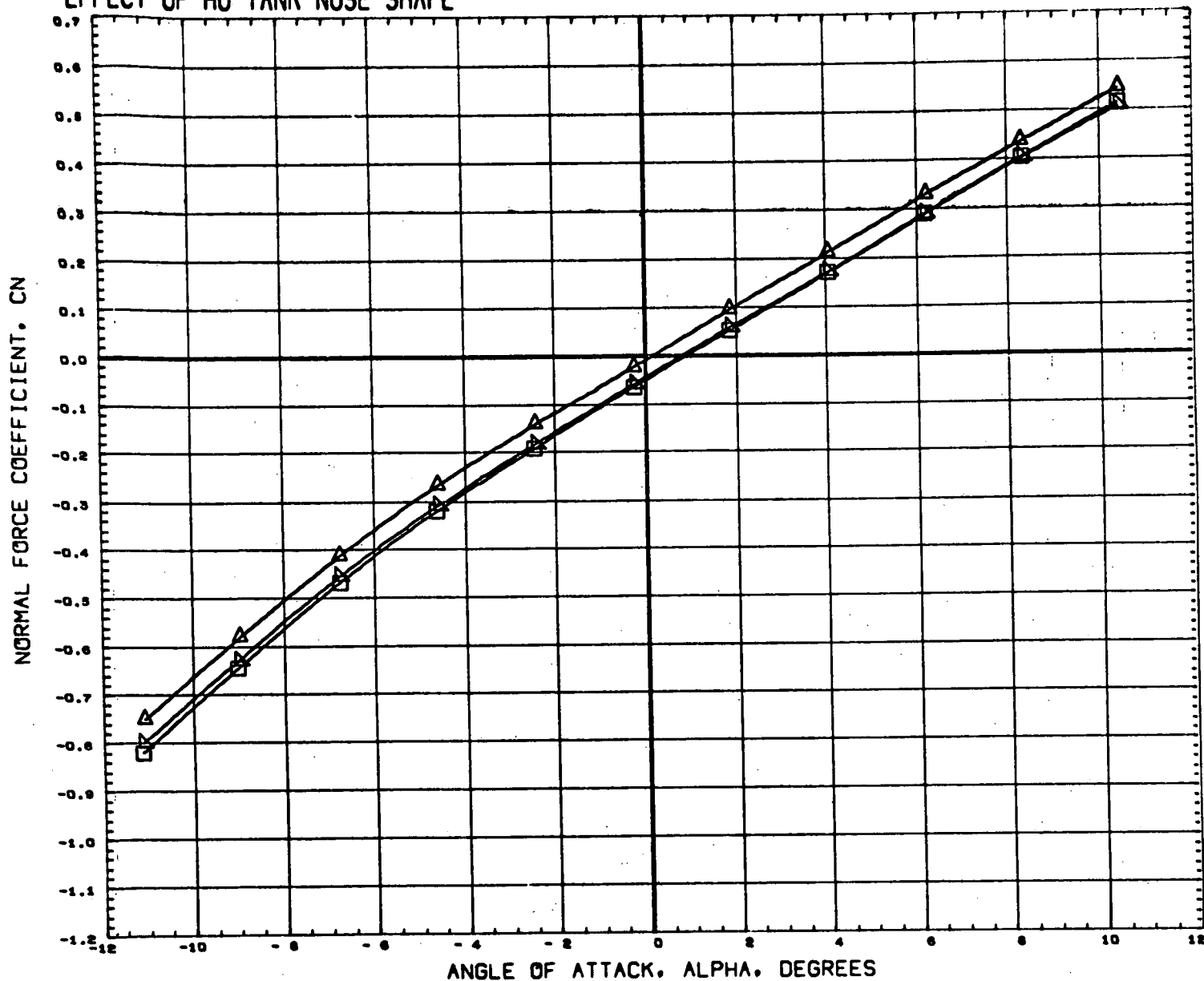


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF NO TANK NOSE SHAPE

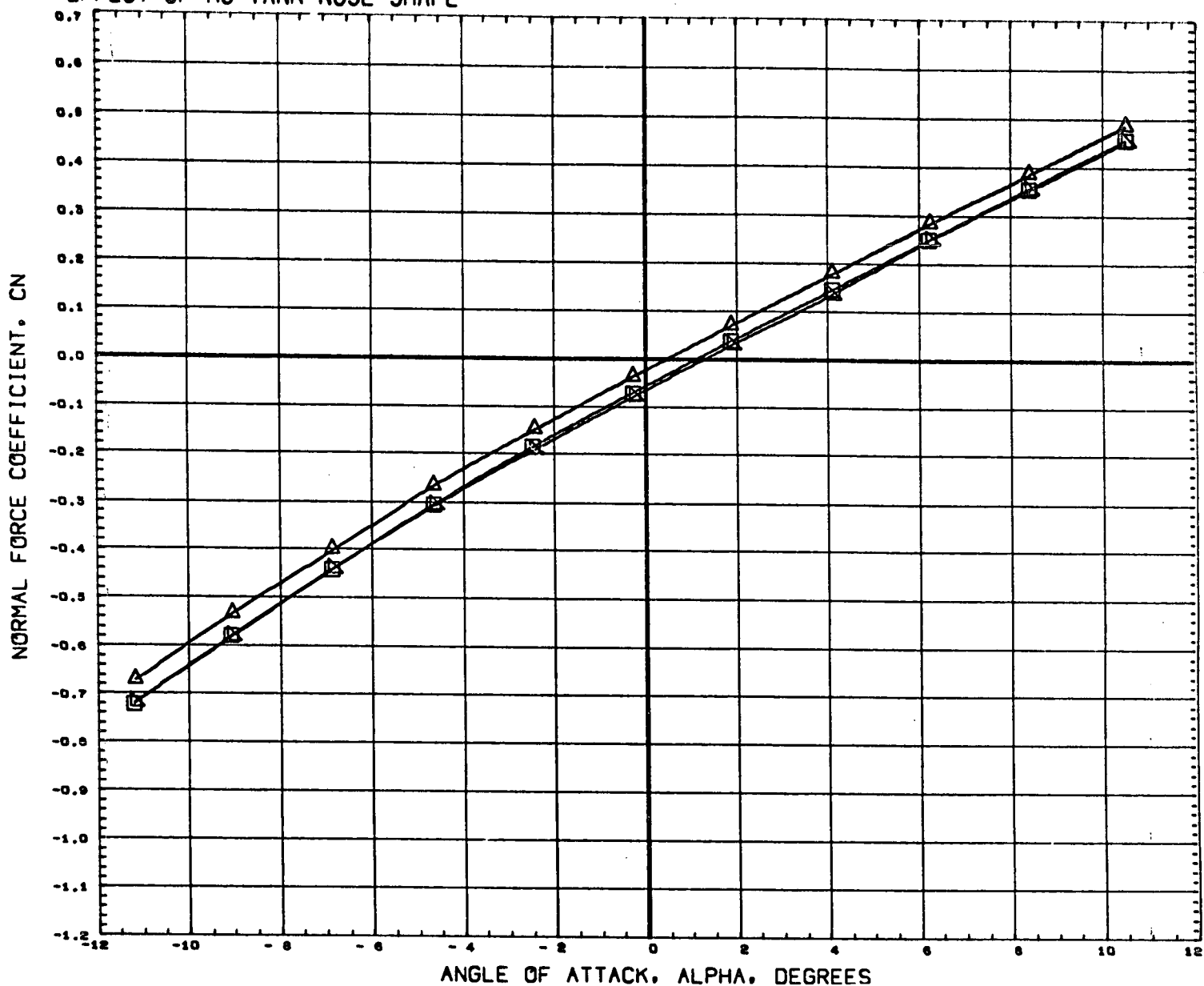


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

PAGE 17

EFFECT OF HO TANK NOSE SHAPE

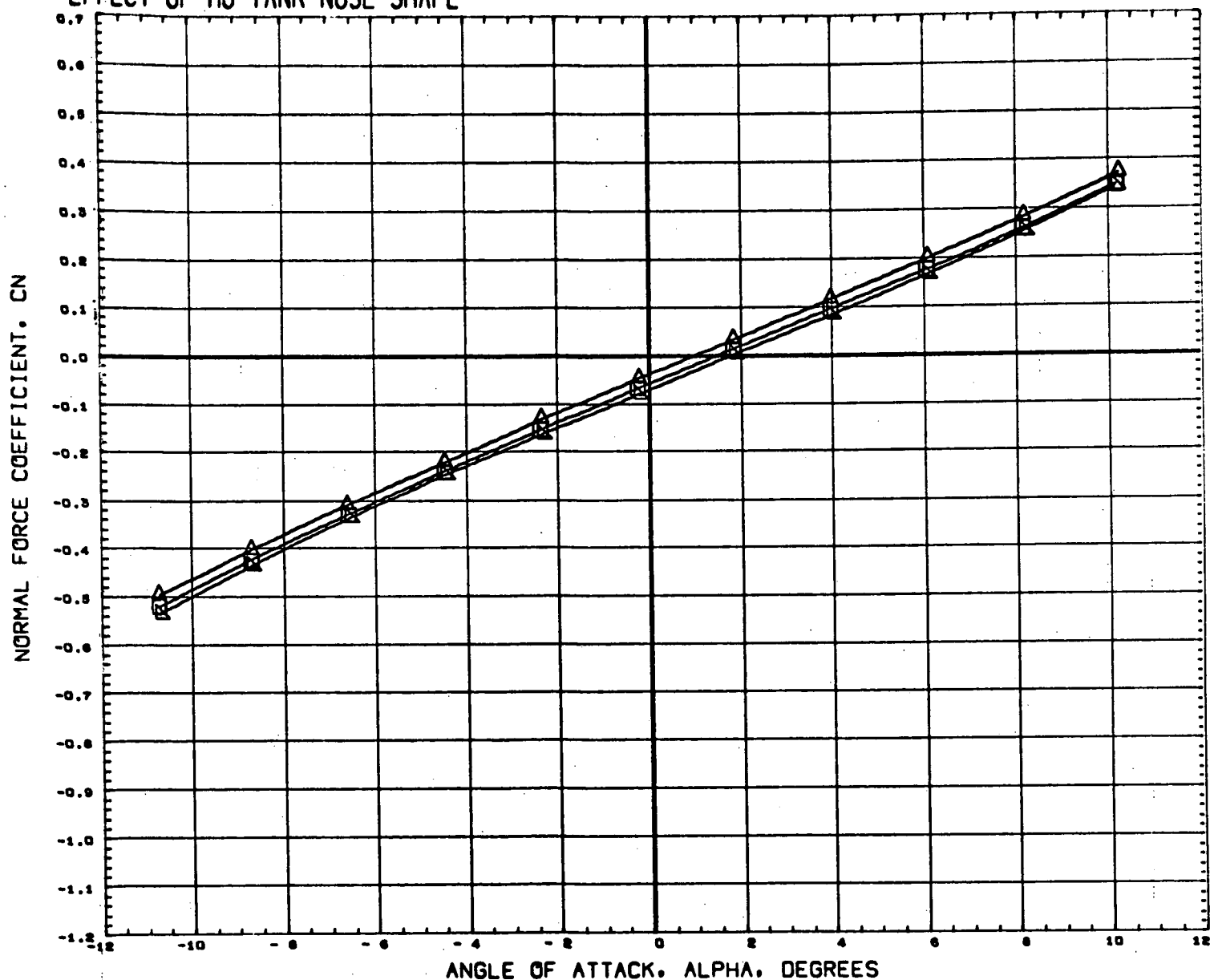


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMWP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMWP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMWP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

PAGE 18

EFFECT OF HO TANK NOSE SHAPE

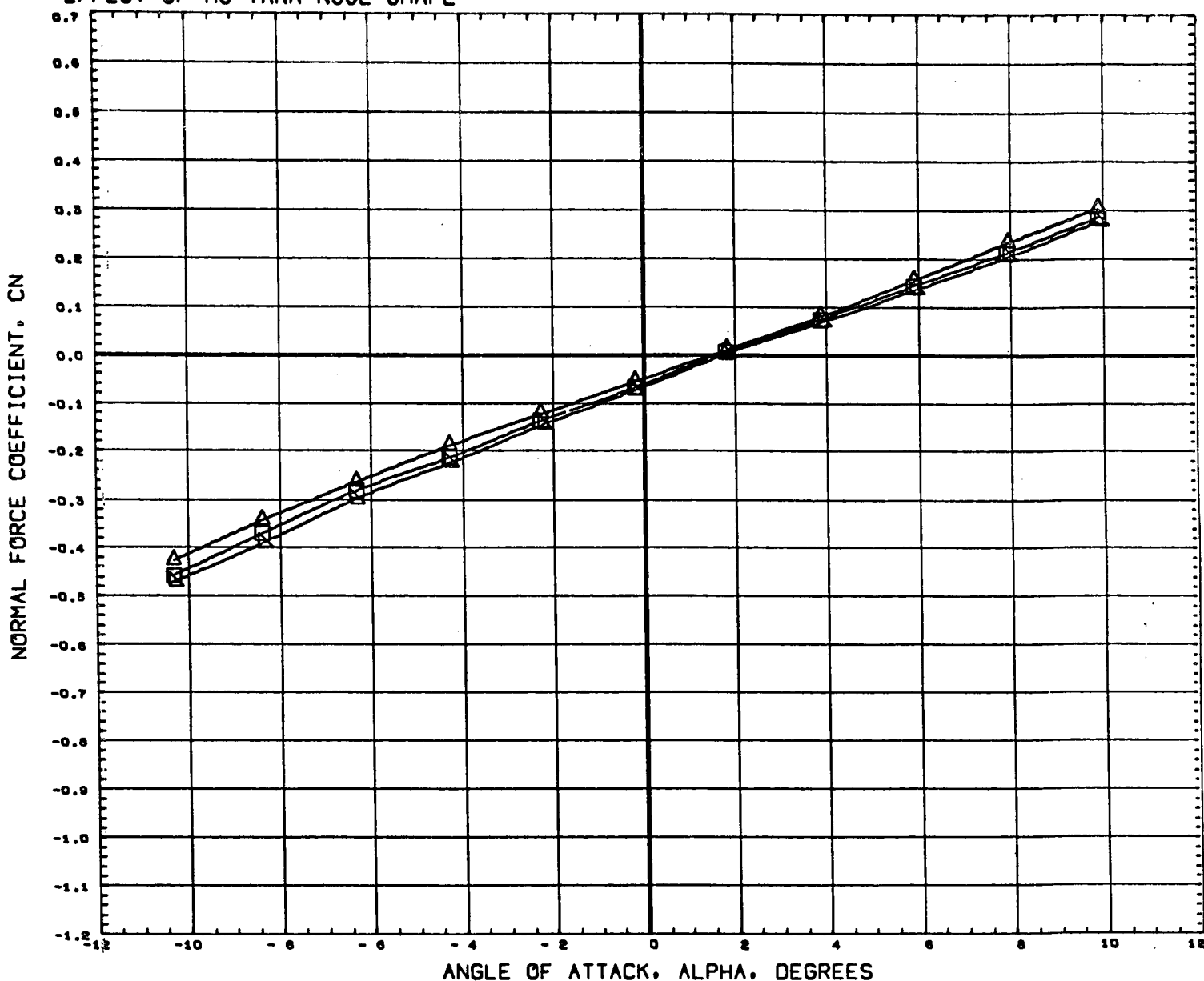


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8900 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T80231 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T100231 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

PAGE 19

EFFECT OF HO TANK NOSE SHAPE



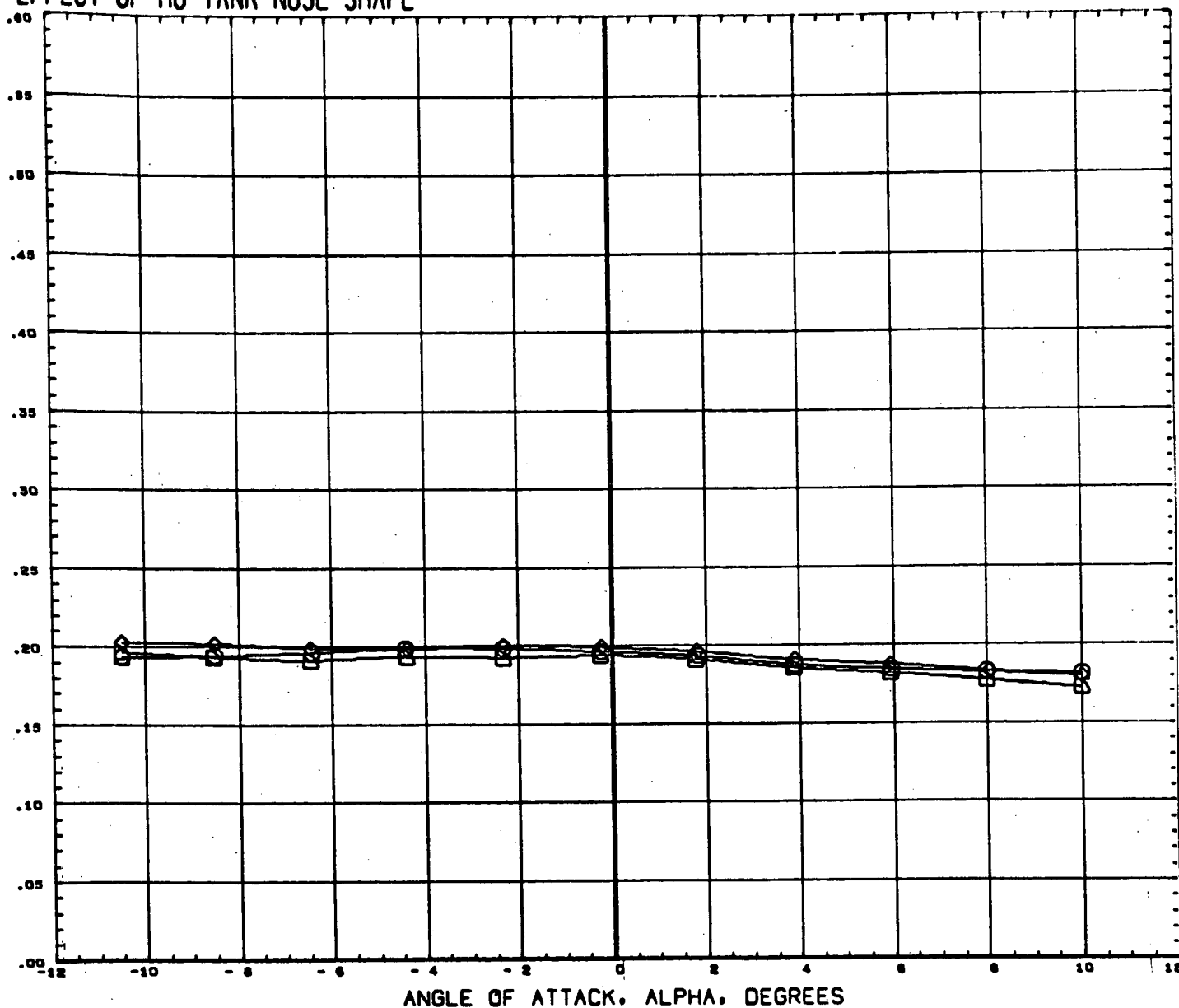
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ.IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRF | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

PAGE 20

EFFECT OF HO TANK NOSE SHAPE

AXIAL FORCE COEFFICIENT, CA

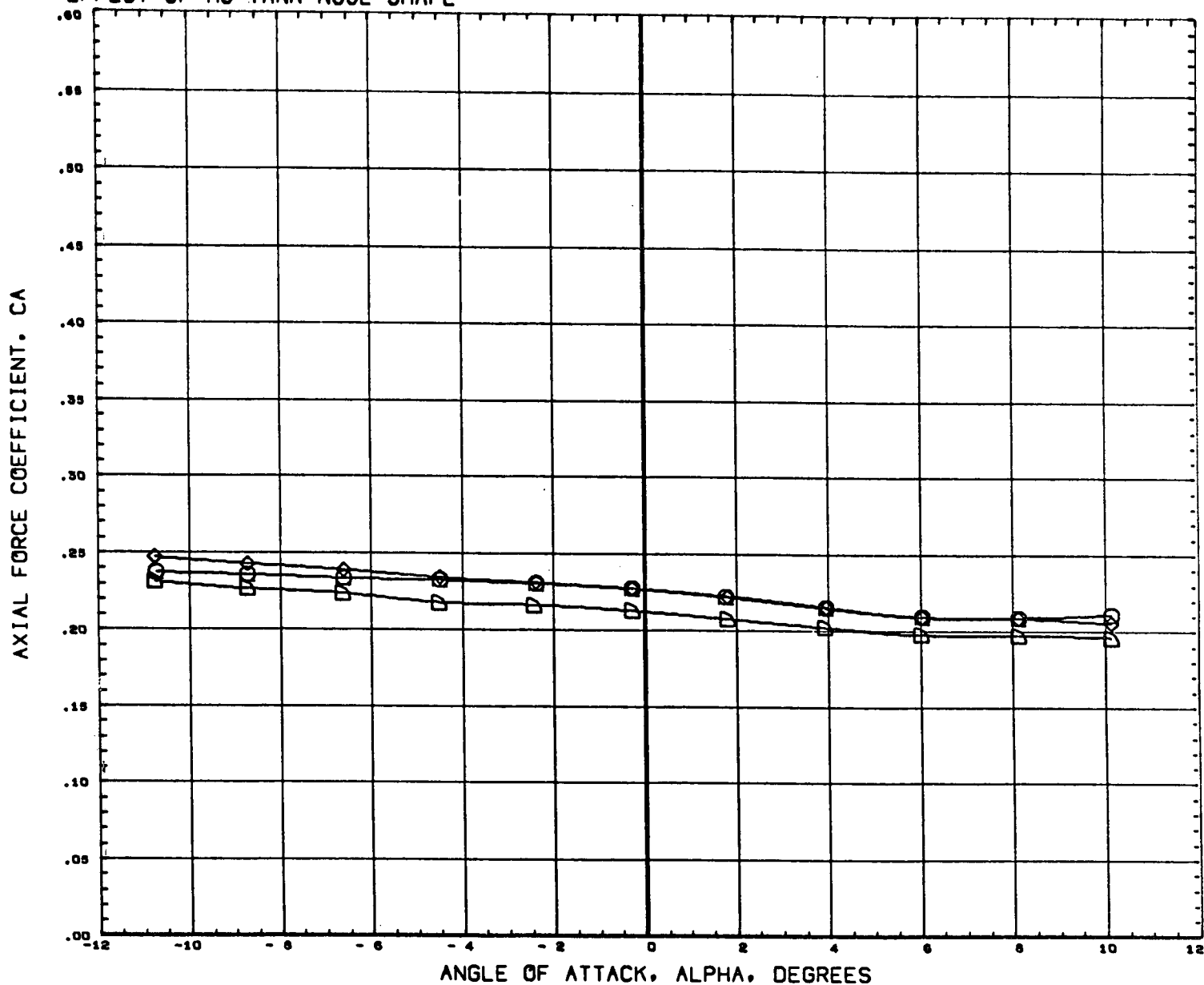


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871121) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T601S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 21

EFFECT OF NO TANK NOSE SHAPE

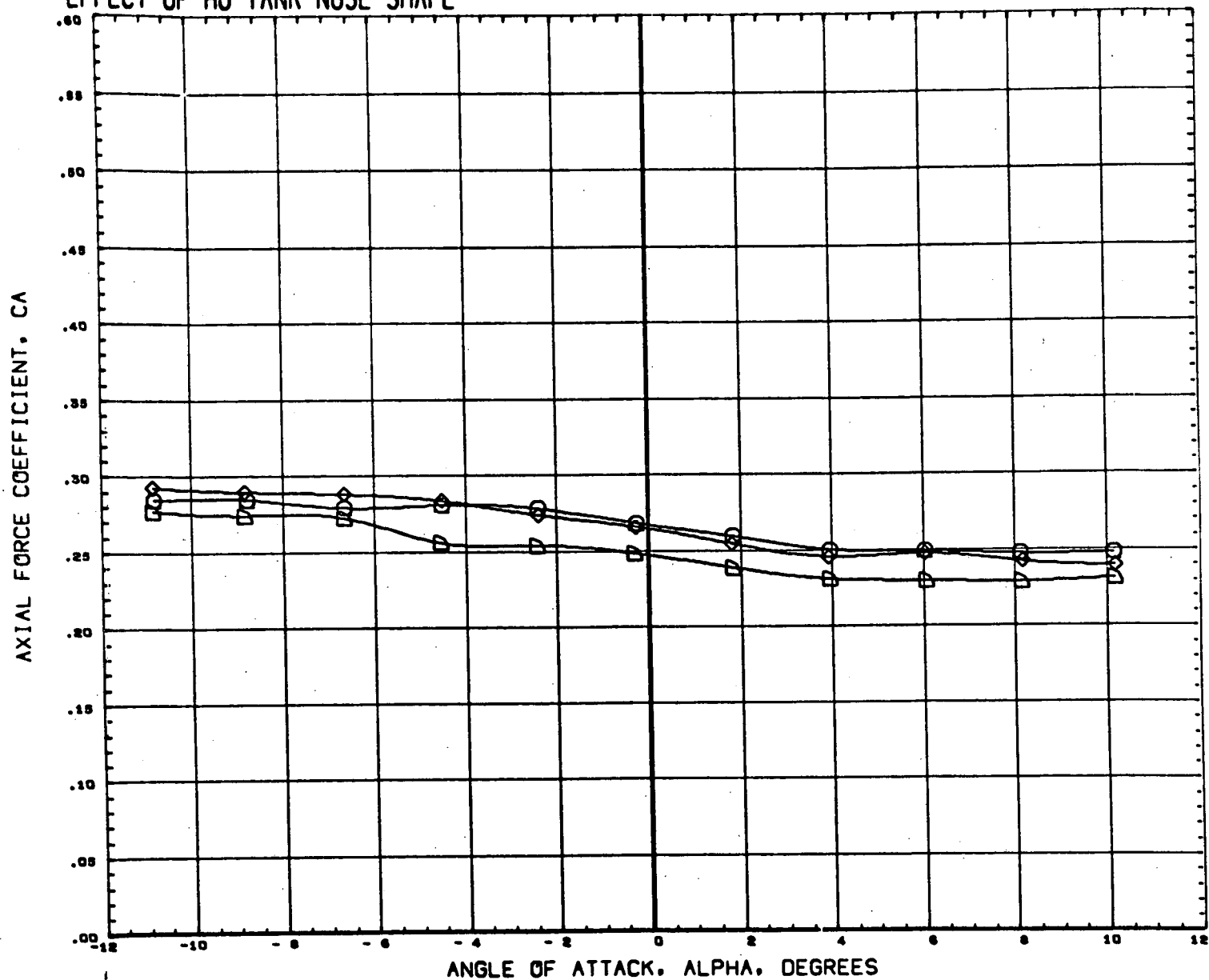


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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EFFECT OF HO TANK NOSE SHAPE

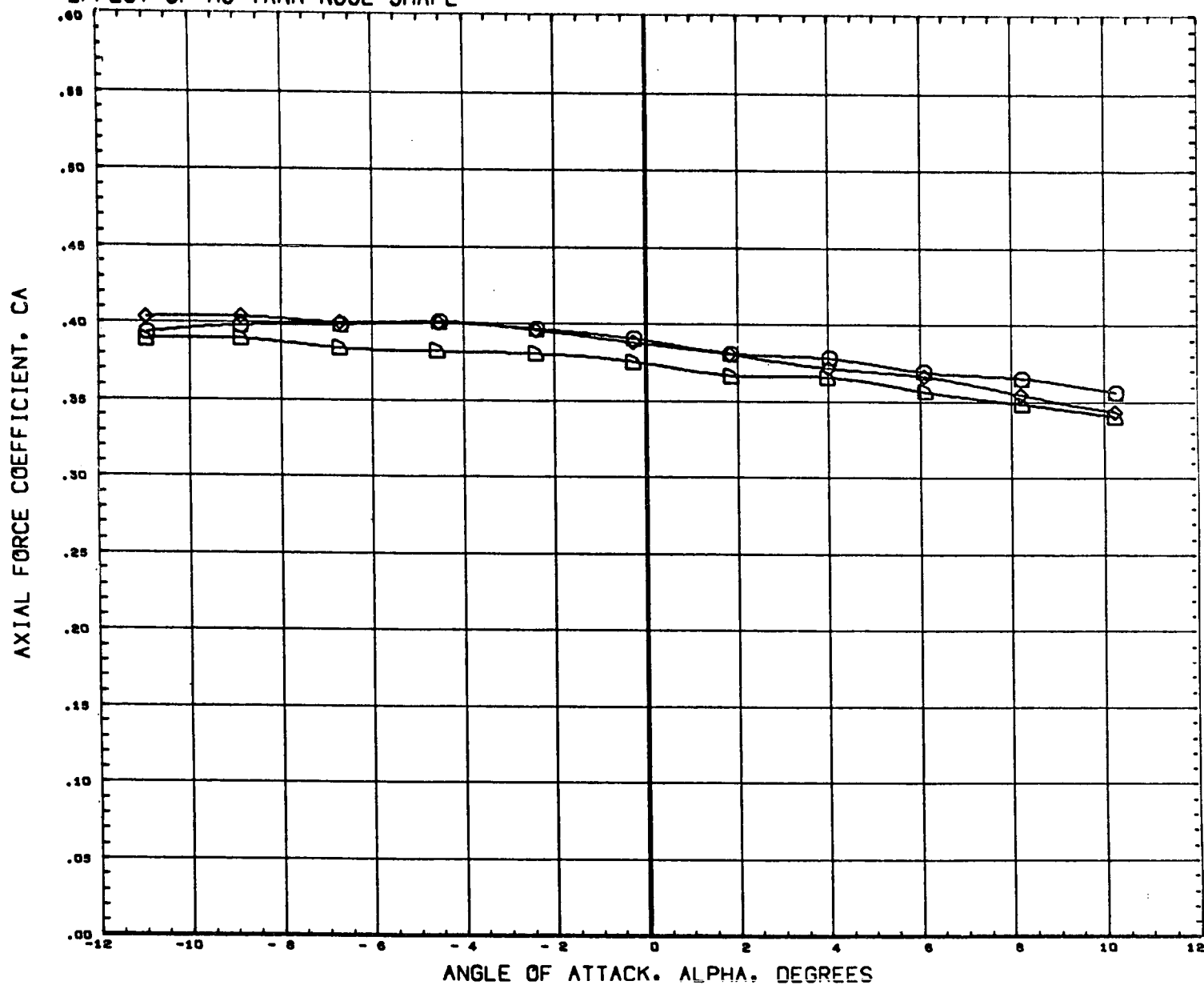


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF HO TANK NOSE SHAPE

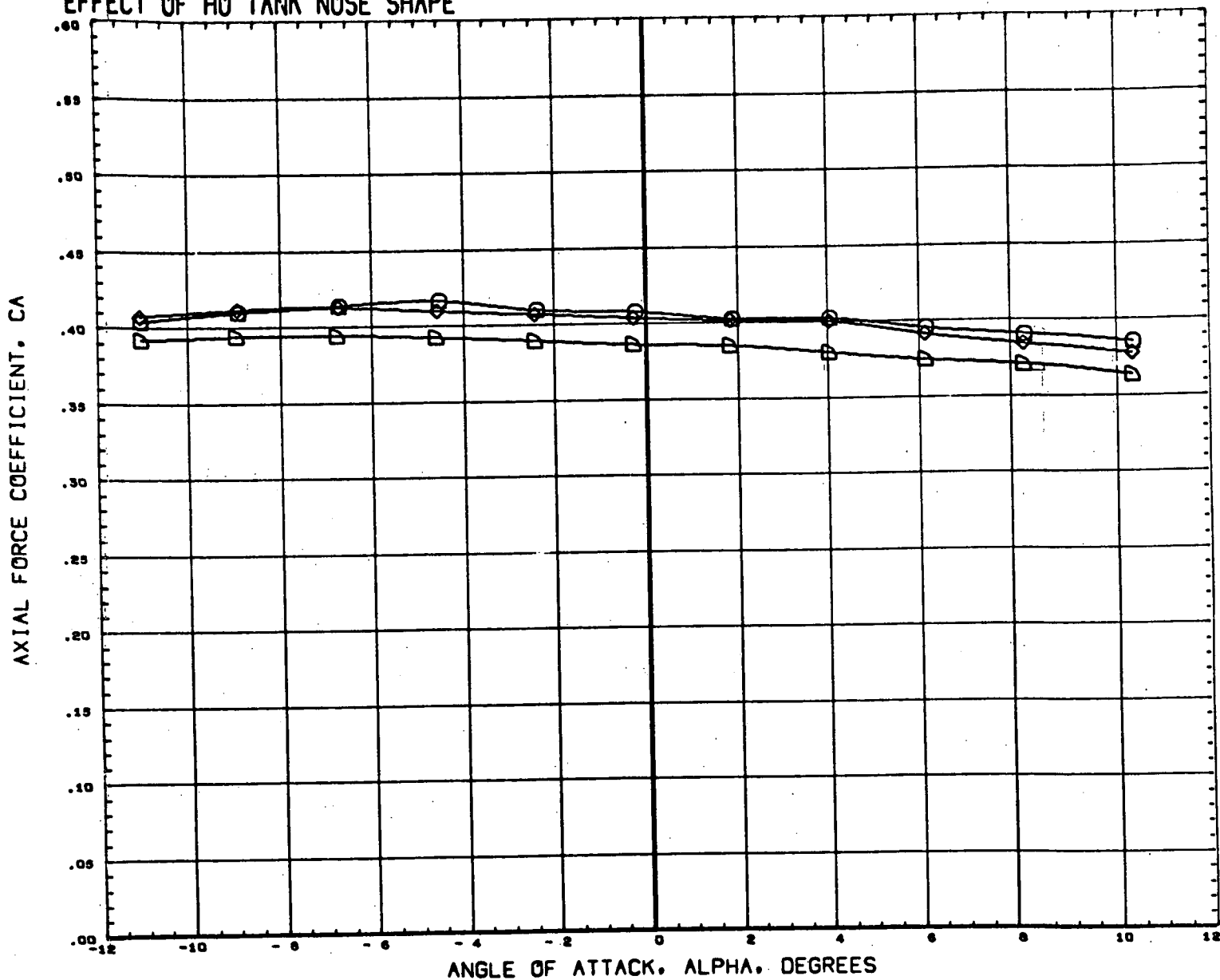


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

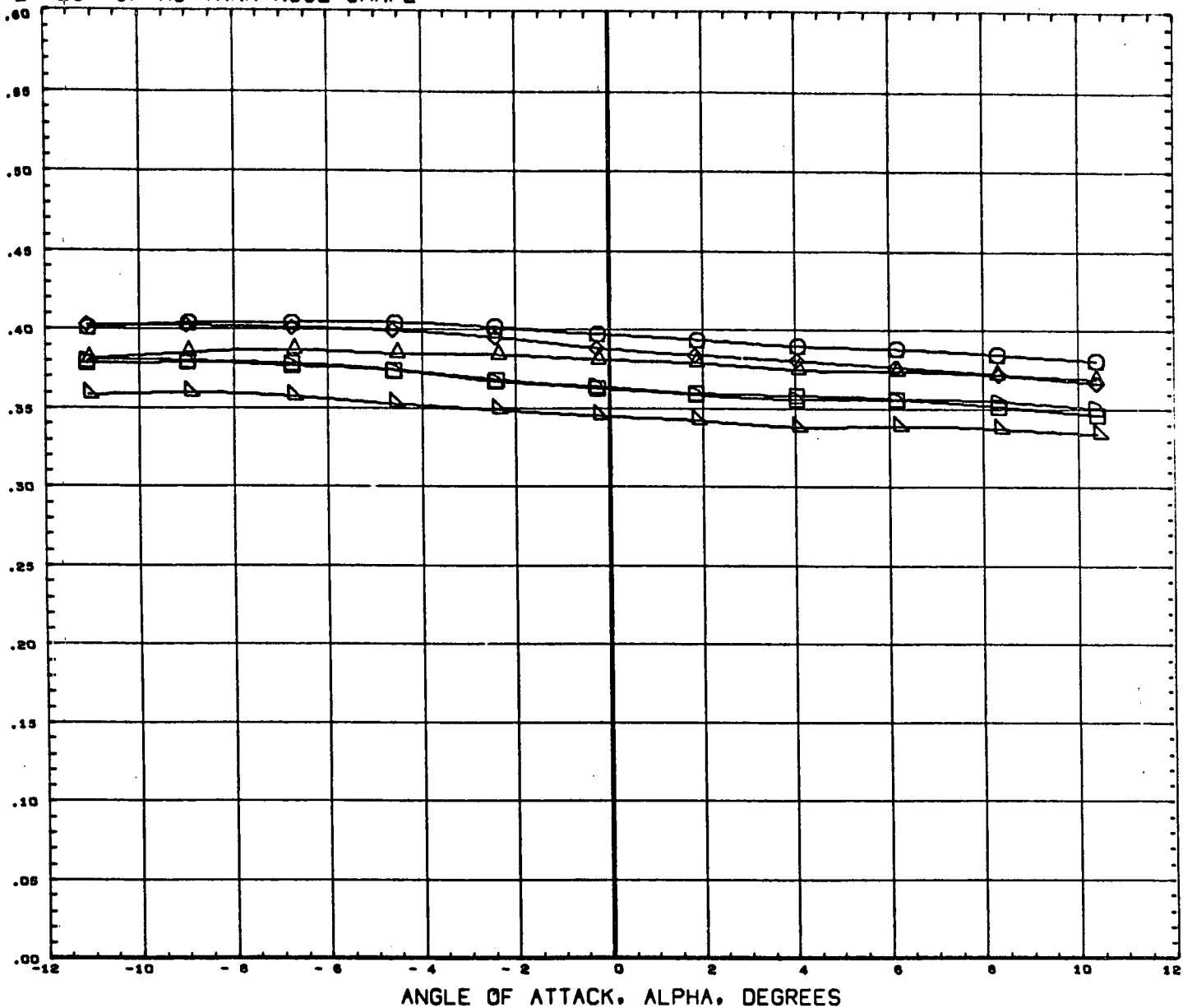
1.10

PPAGE

25

EFFECT OF NO TANK NOSE SHAPE

AXIAL FORCE COEFFICIENT, CA

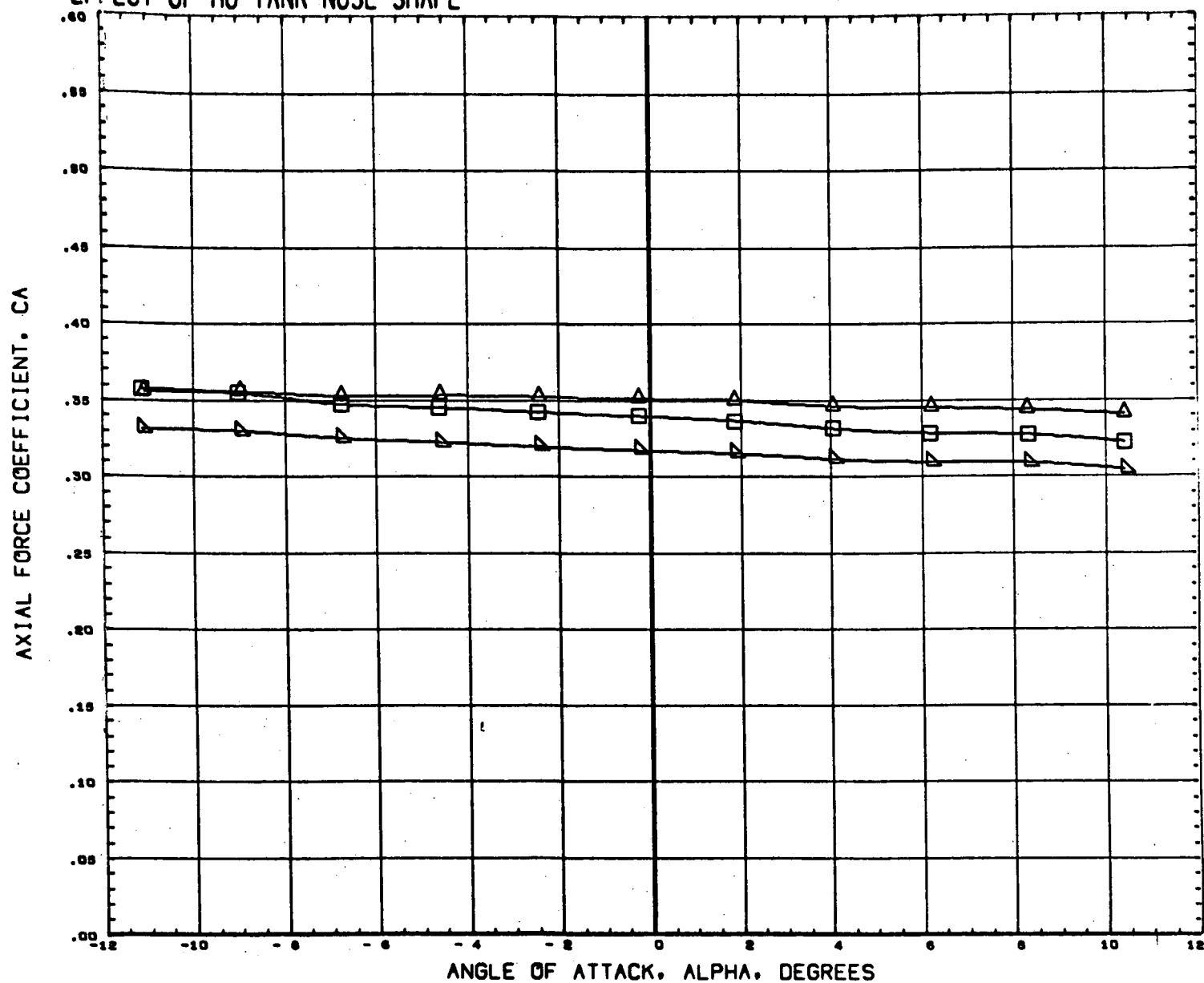


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YHRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF HO TANK NOSE SHAPE



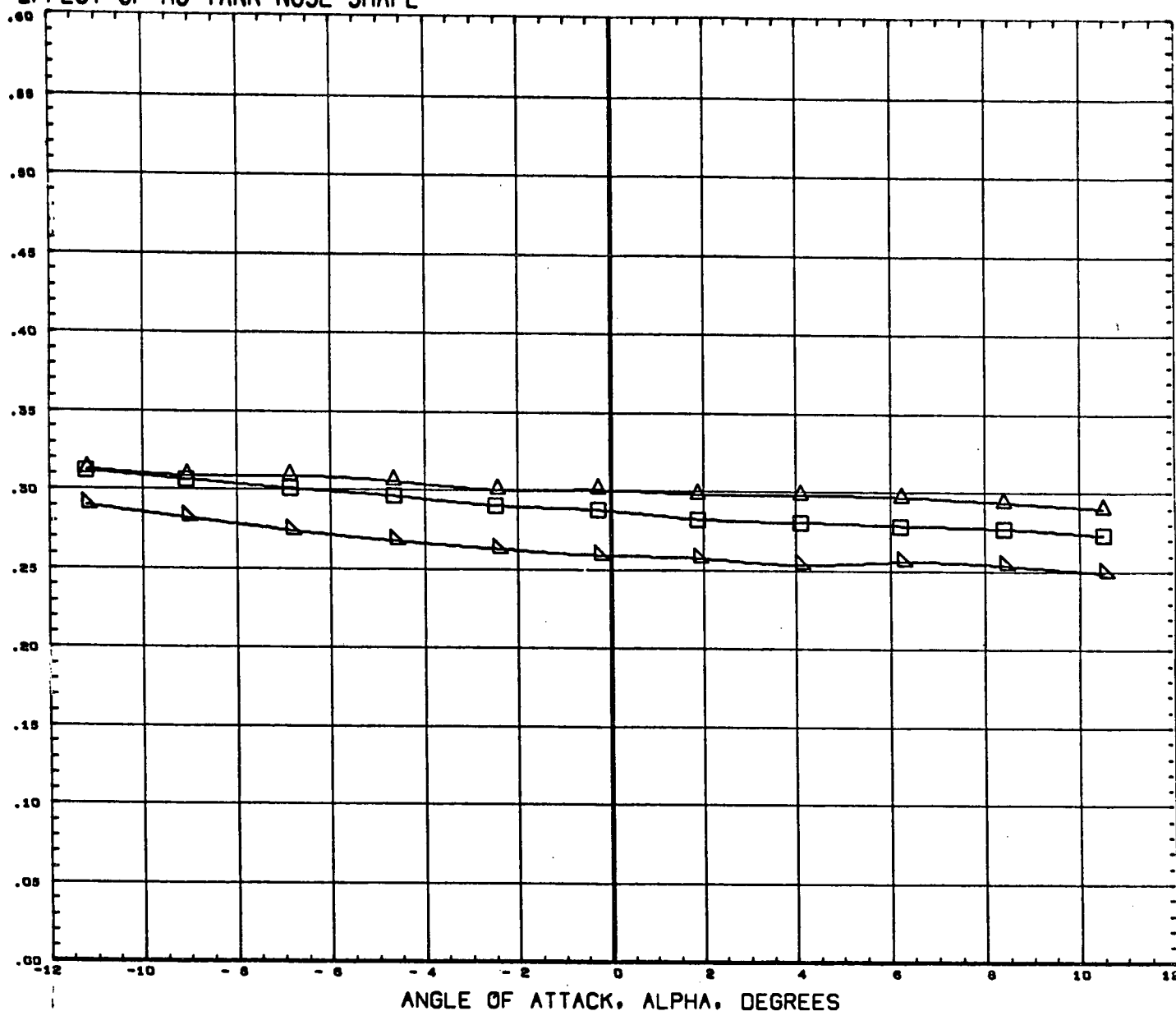
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T80251 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T100251 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF HO TANK NOSE SHAPE

AXIAL FORCE COEFFICIENT, CA

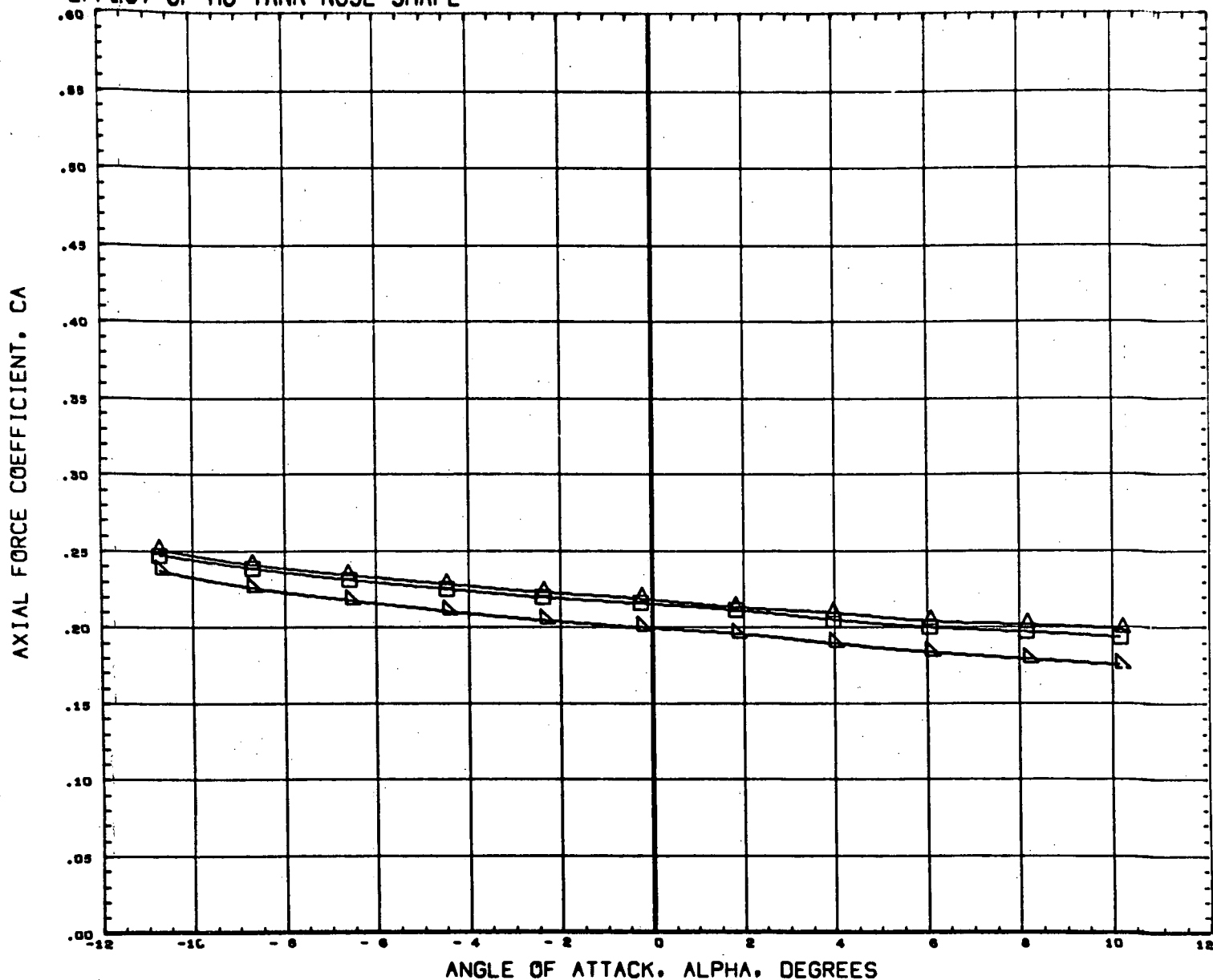


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF HO TANK NOSE SHAPE



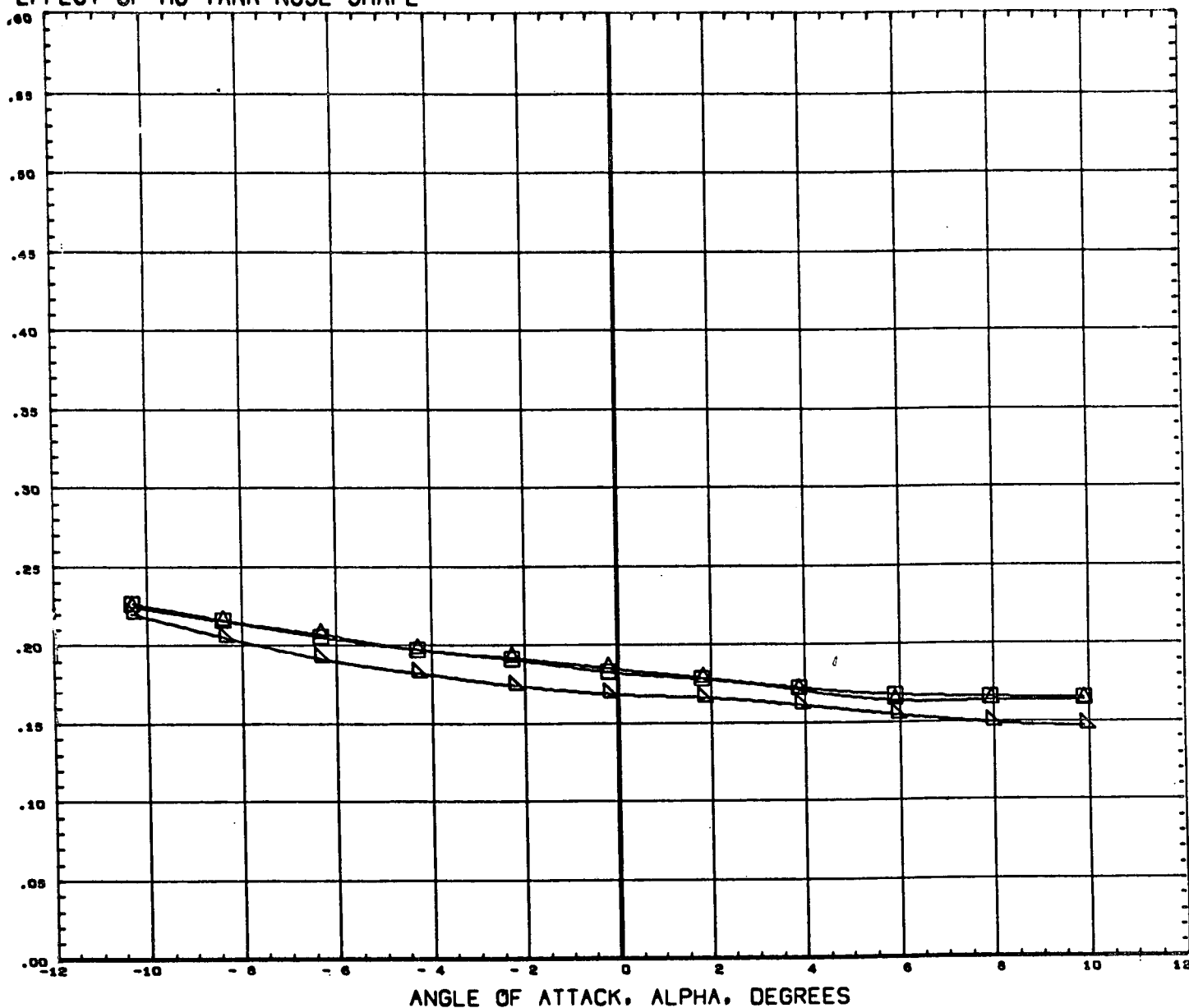
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|--|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 | 30. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4800 | IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T602S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 3.48

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EFFECT OF NO TANK NOSE SHAPE

AXIAL FORCE COEFFICIENT, CA



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302s1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802s1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002s1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

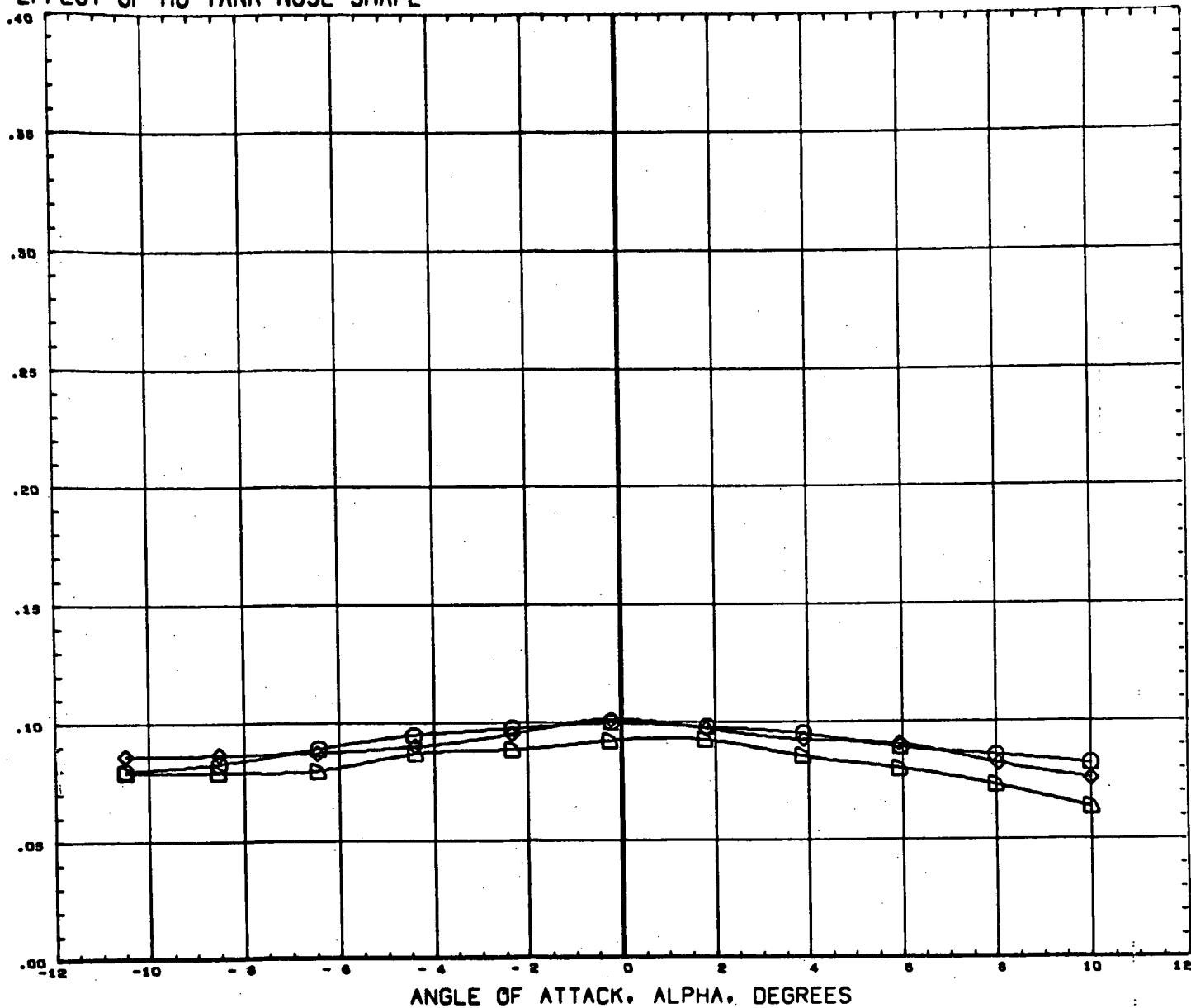
4.96

PAGE

30

EFFECT OF HQ TANK NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF

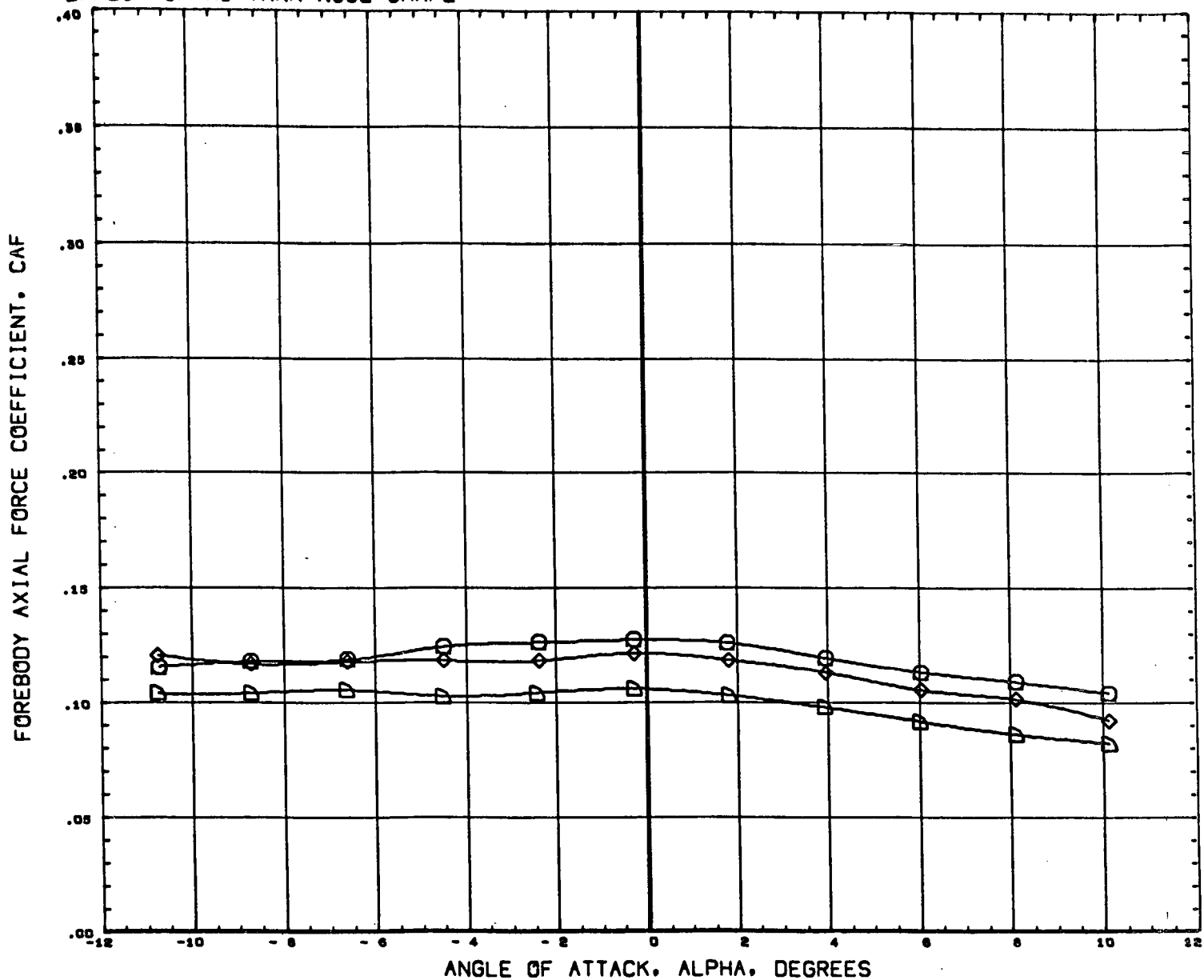


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRF | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF HO TANK NOSE SHAPE



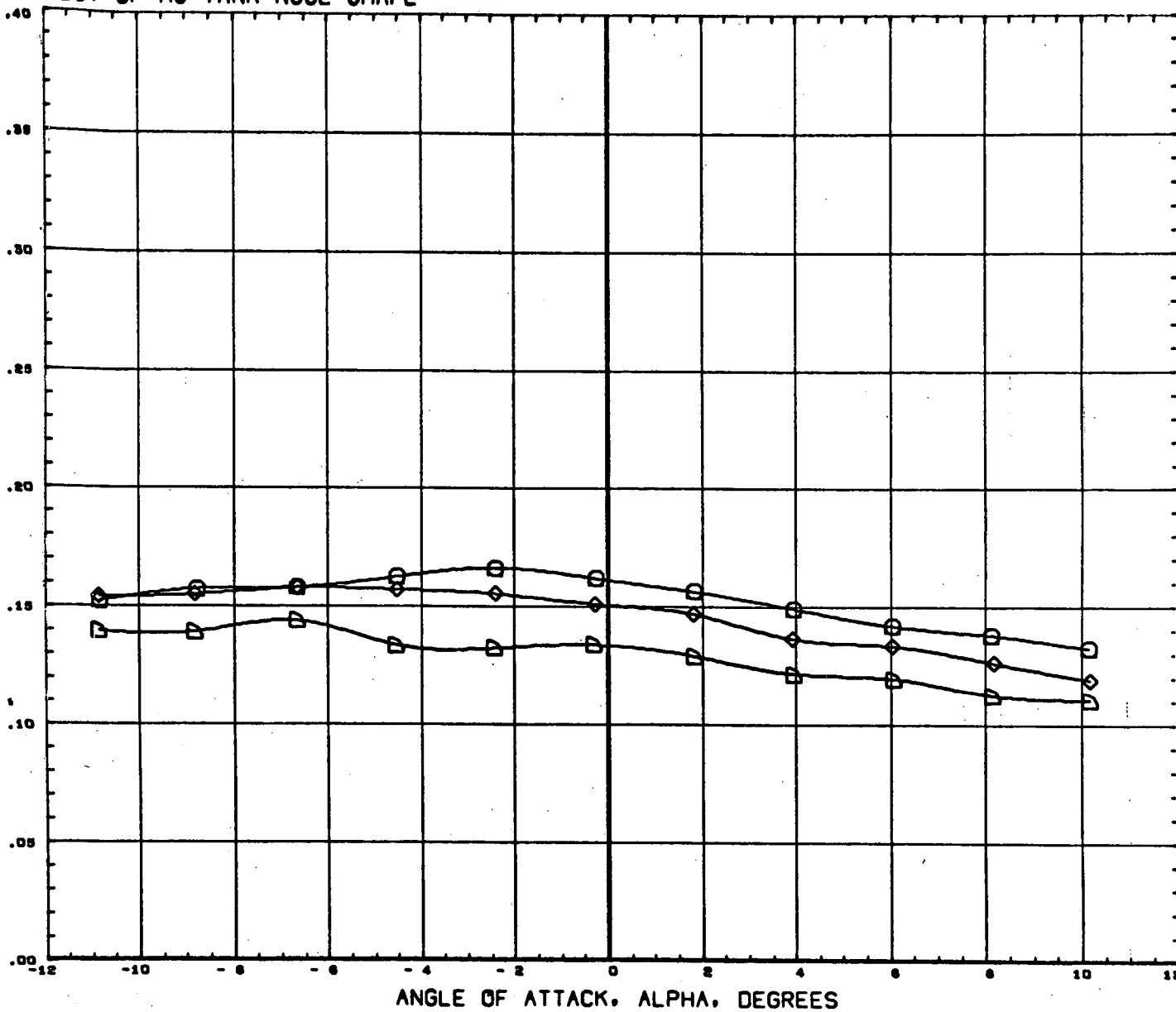
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (D71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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EFFECT OF HO TANK NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



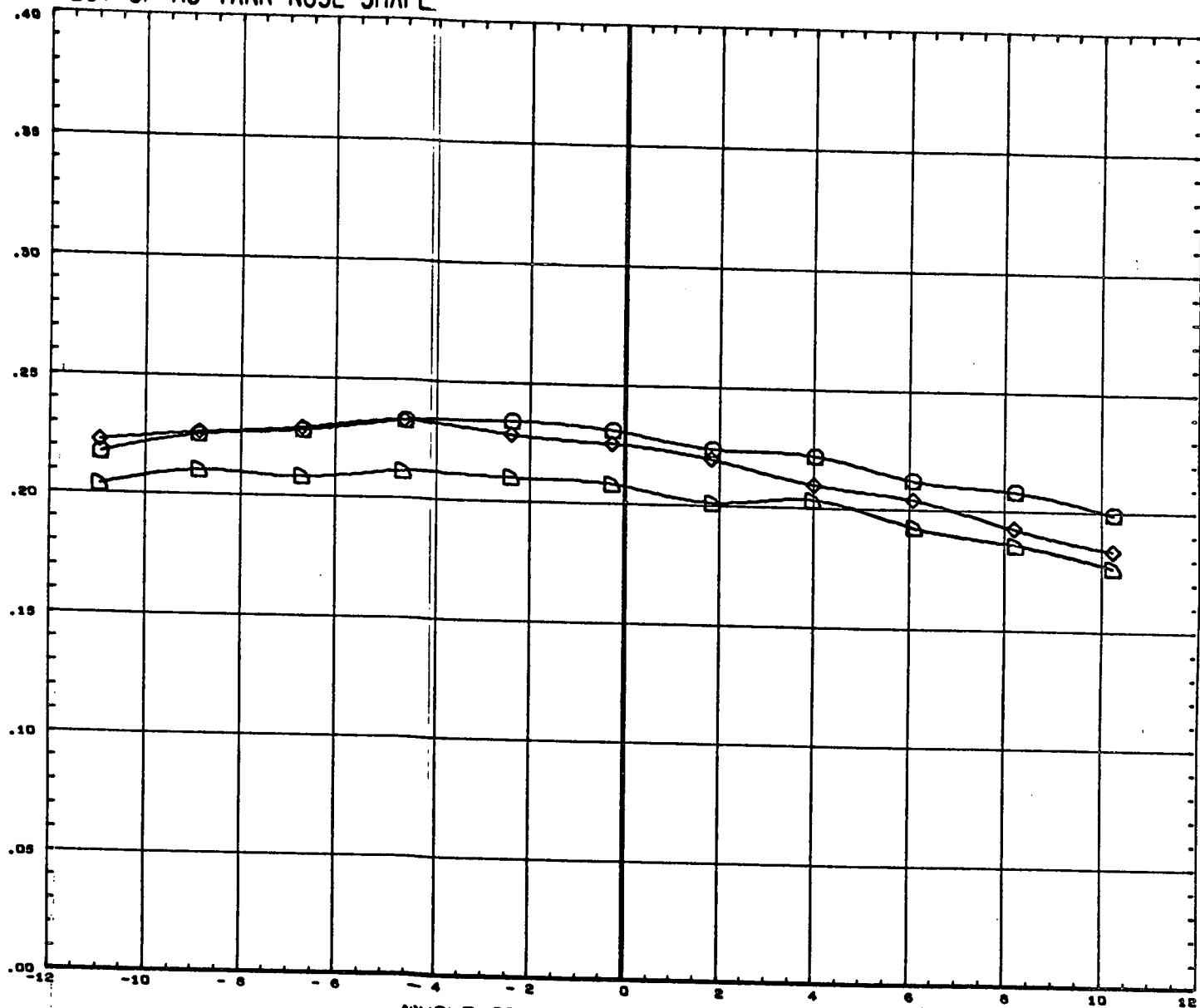
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871059) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF HO TANK NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF

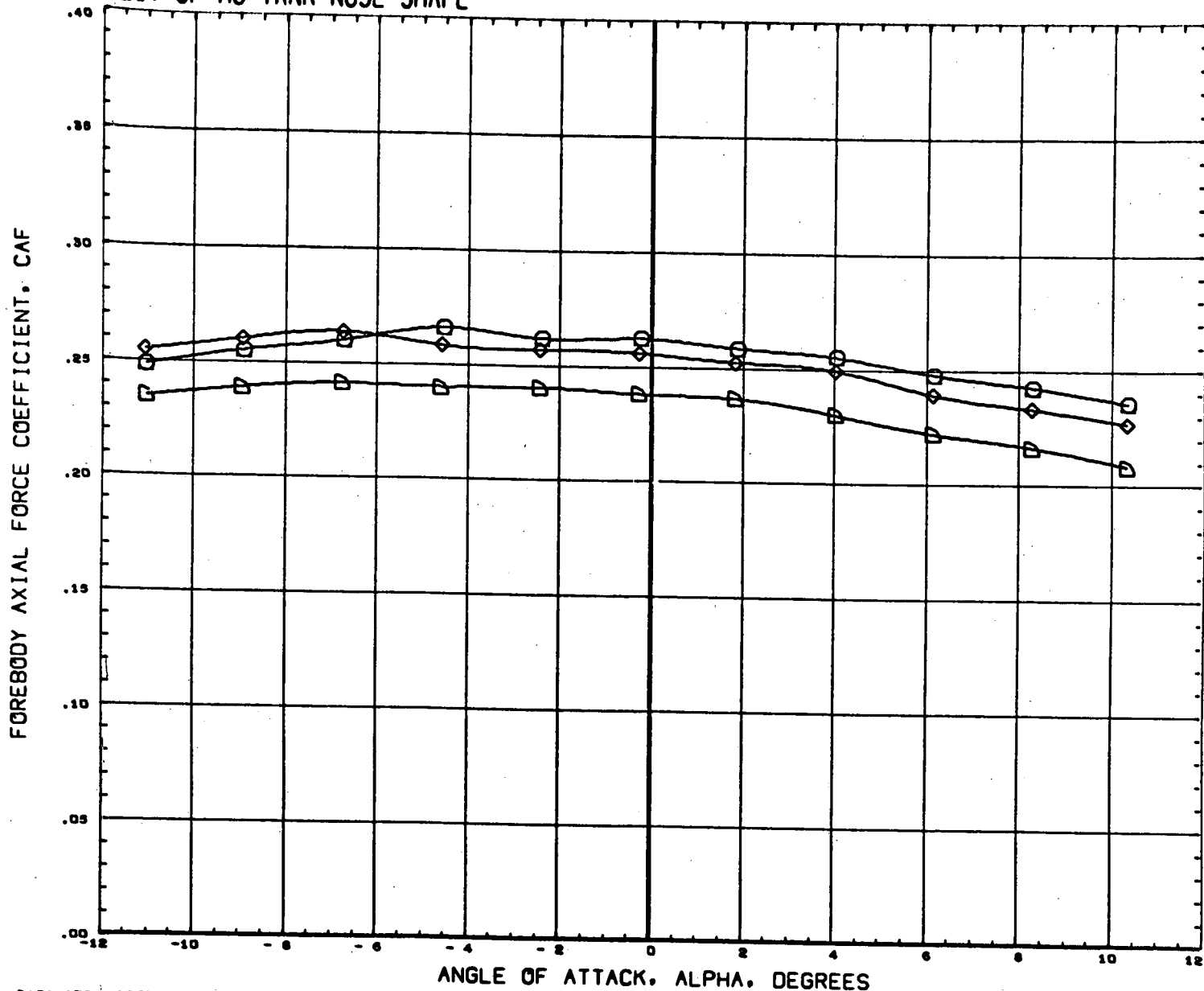


ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITAL | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|--|---------|-------|--------|--------|-----------------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XNRP 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YNRP 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZNRP 0.2460 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH 1.00

EFFECT OF HO TANK NOSE SHAPE



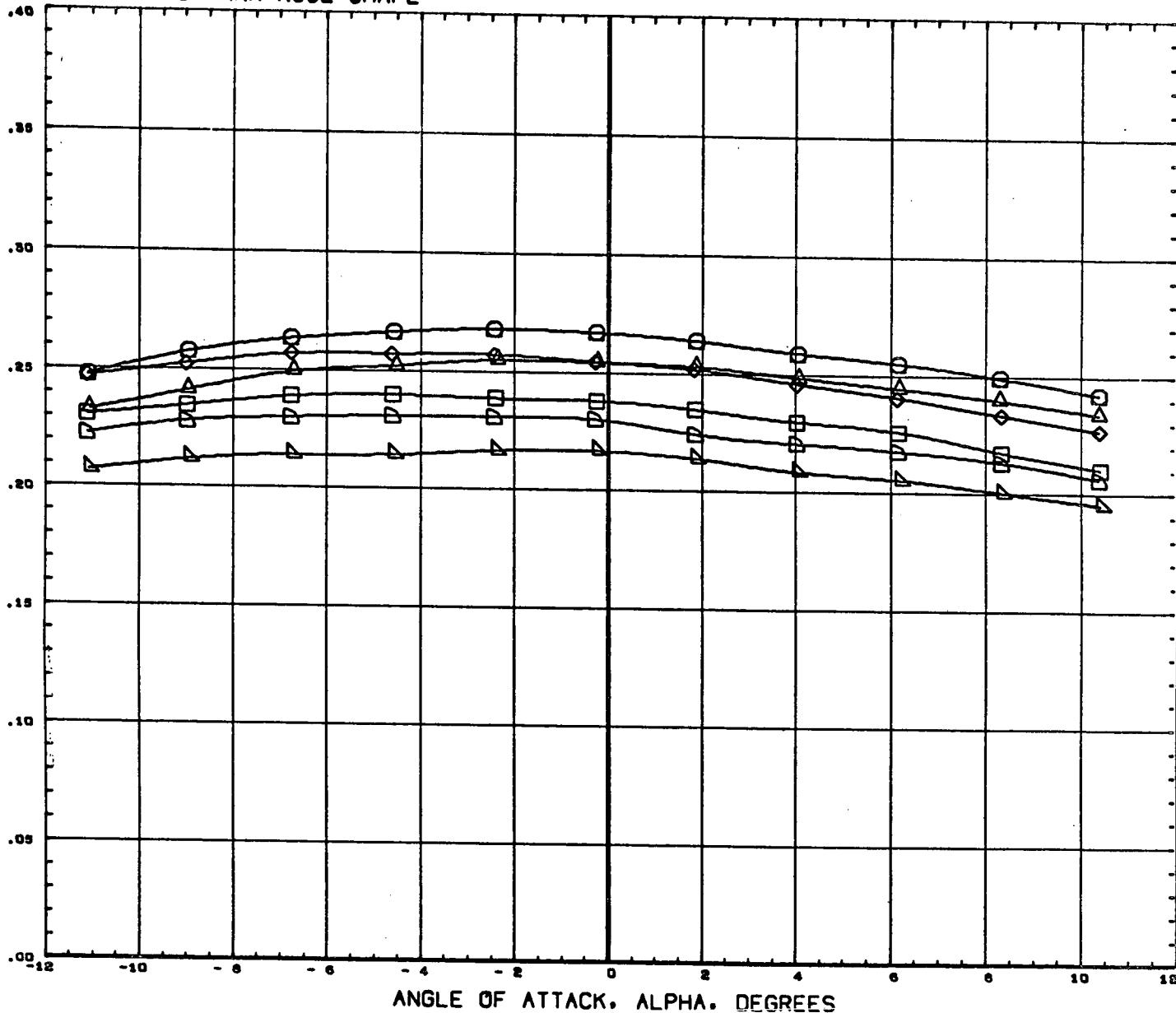
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITAL | Y3 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|---------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.10

EFFECT OF HO TANK NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



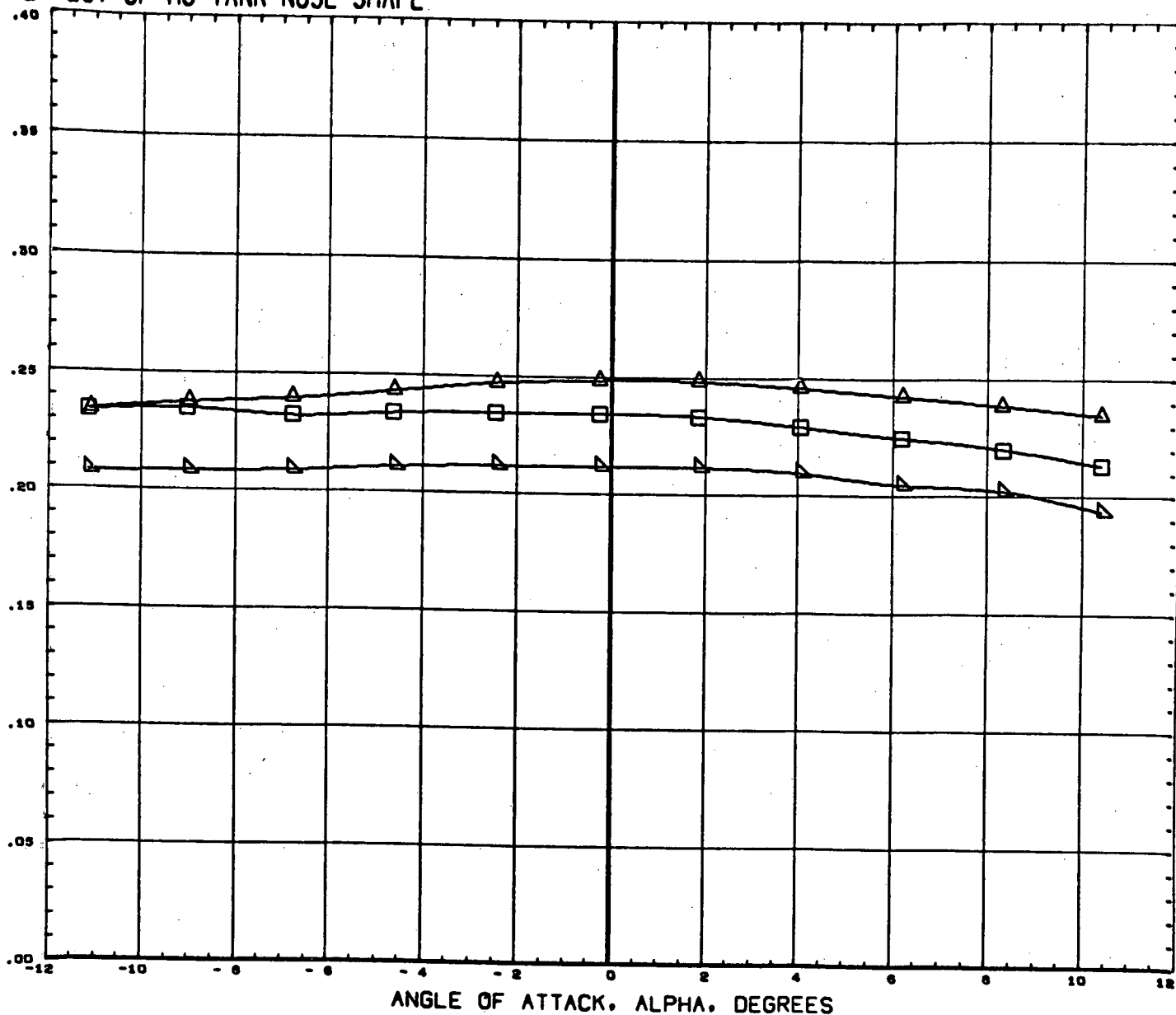
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF HO TANK NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|---------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30.1N. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 1N. |
| (871121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4800 1N. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T80231 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 1N. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T100231 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 1N. |
| (871127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 1N. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

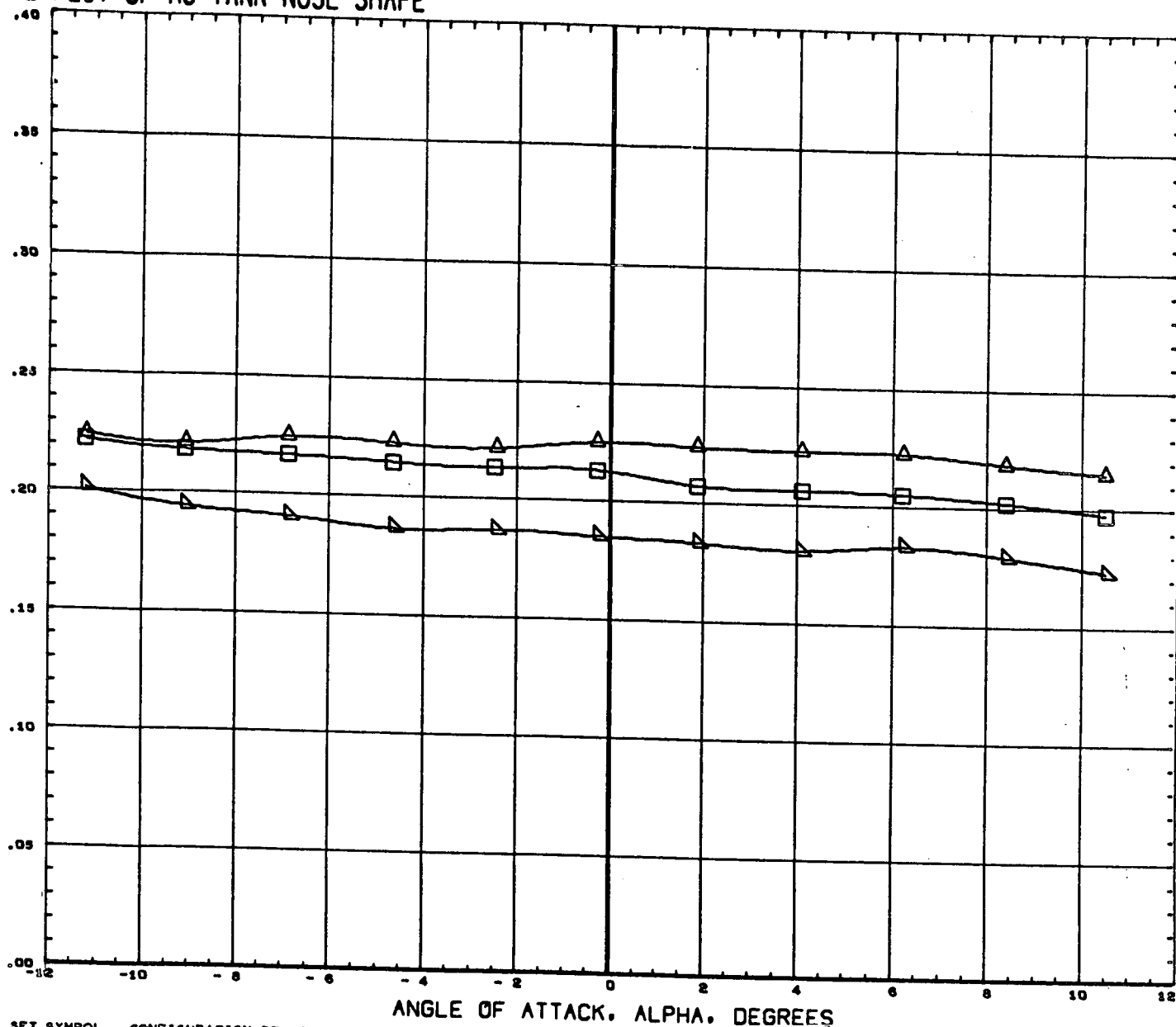
1.46

PAGE

37

EFFECT OF NO TANK NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



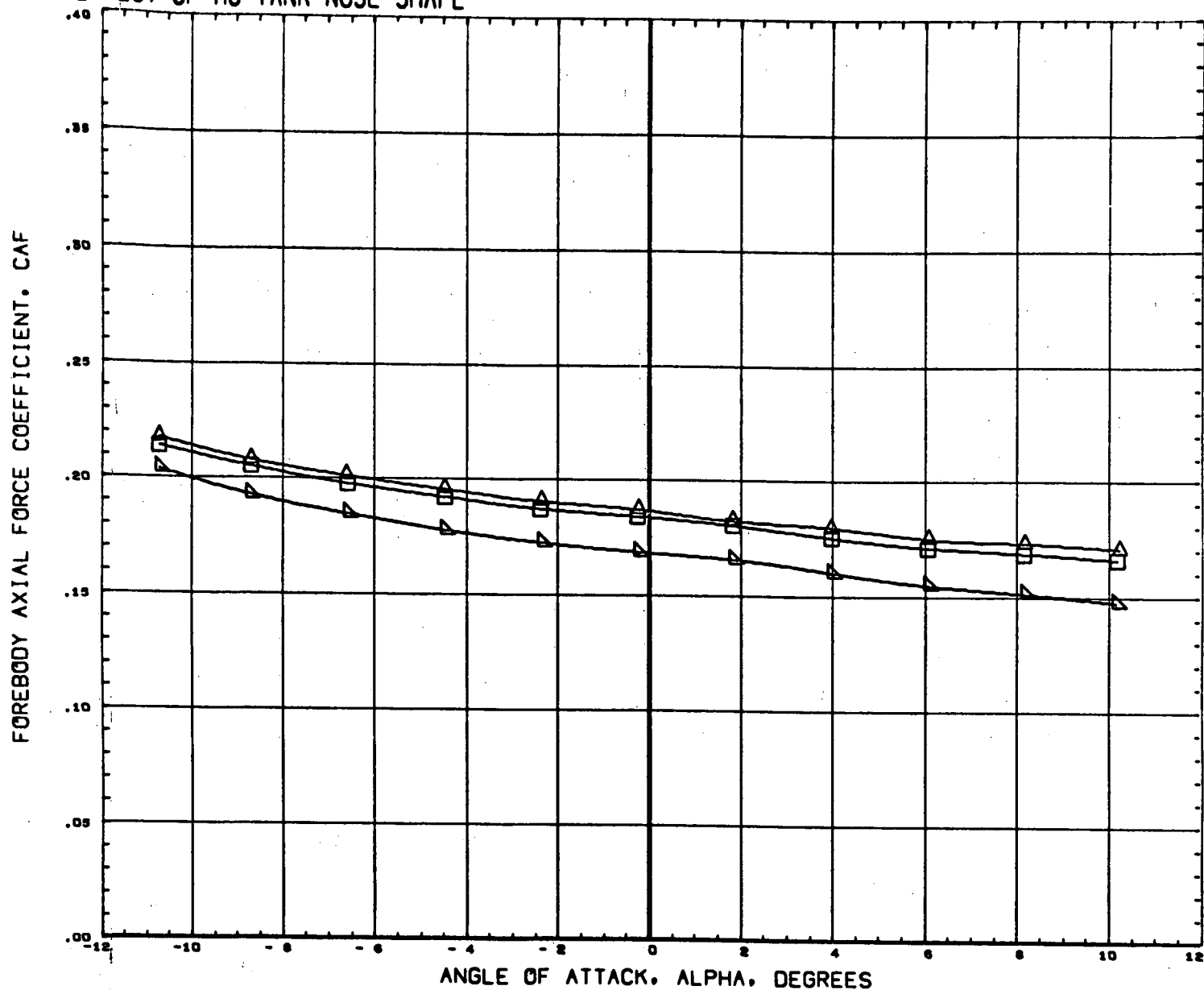
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.95

EFFECT OF HO TANK NOSE SHAPE

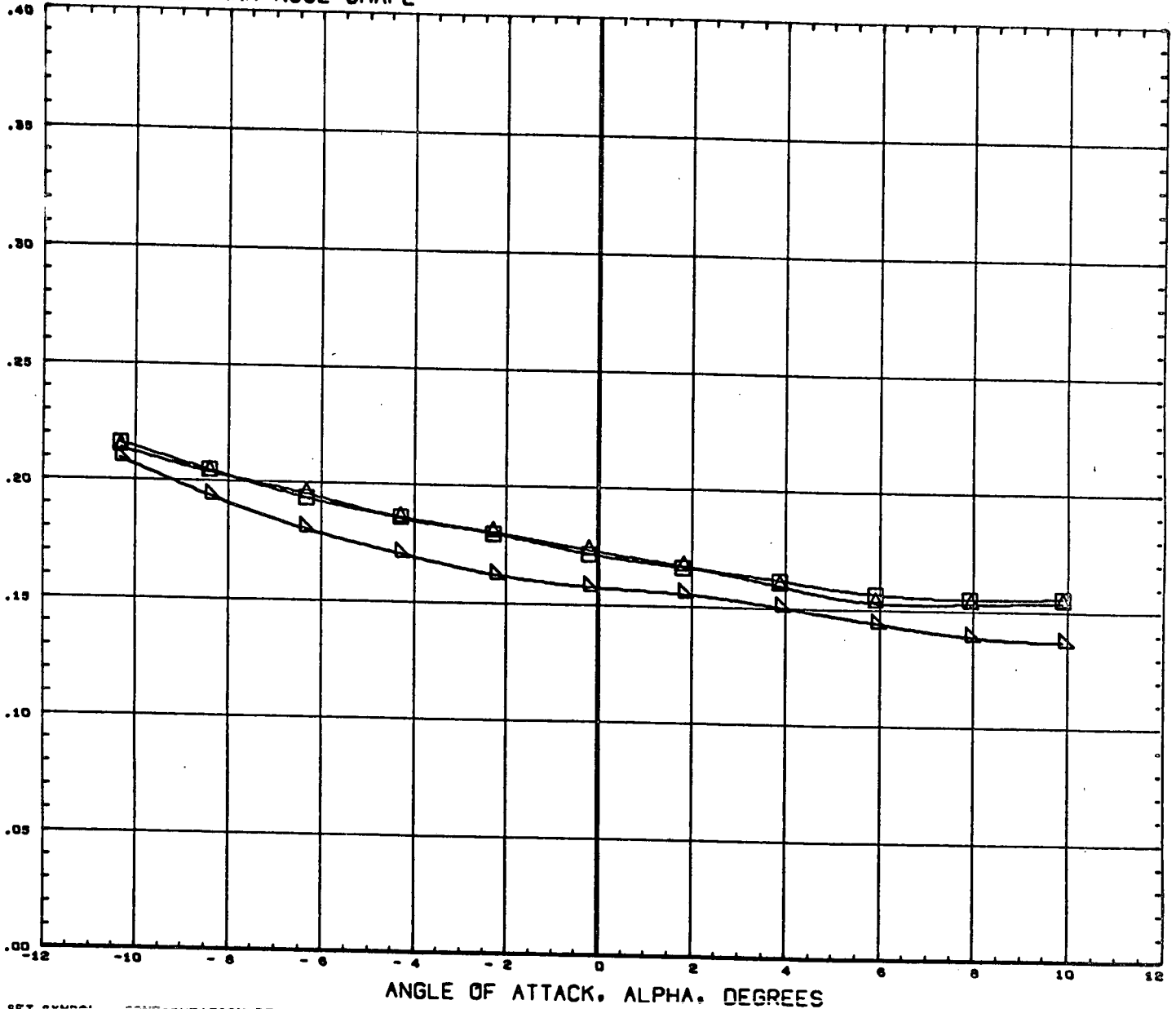


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

EFFECT OF HO TANK NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF

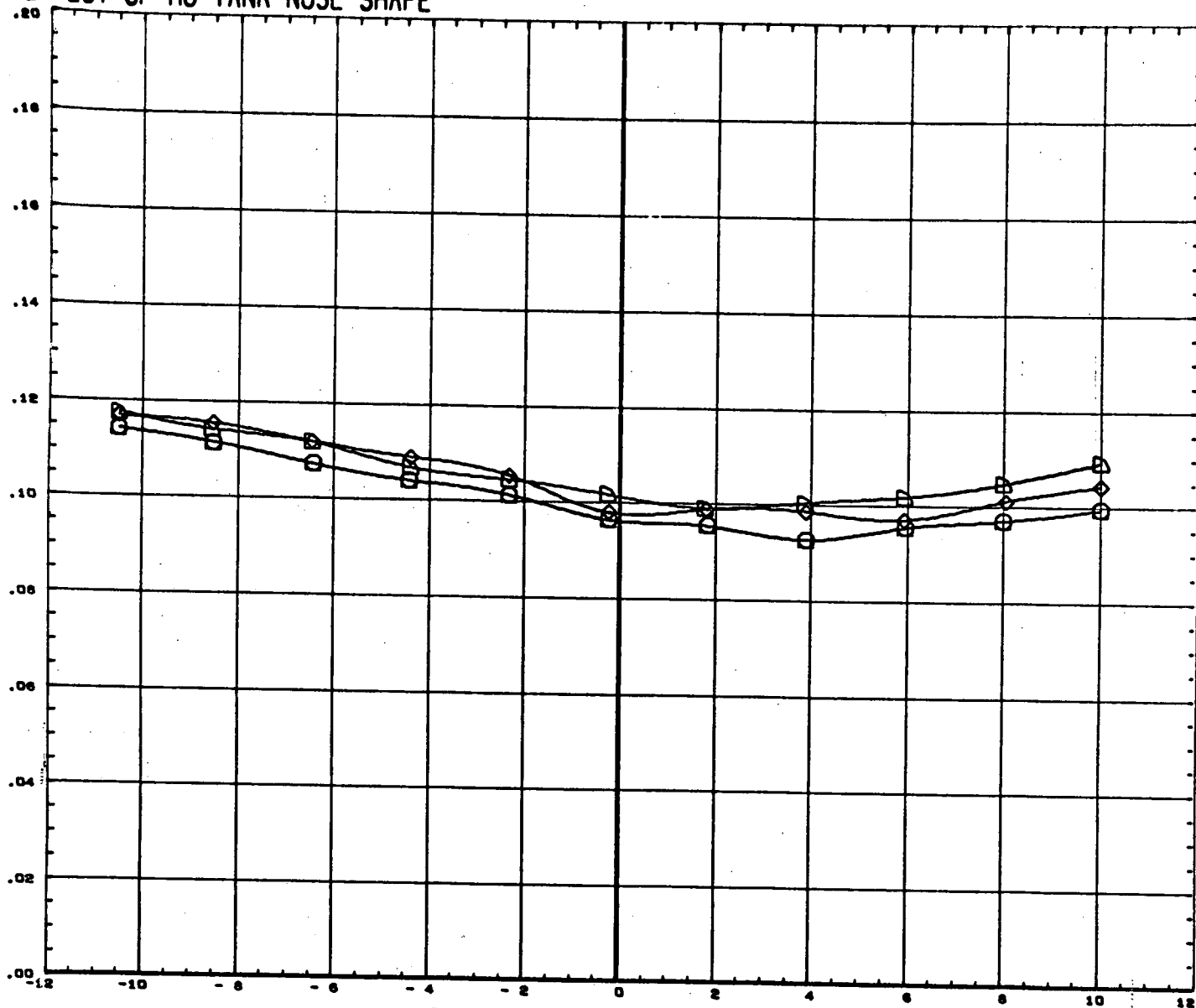


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---------------------------------------|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ.IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

EFFECT OF HO TANK NOSE SHAPE

BASE AXIAL FORCE COEFFICIENT, C_{AB}



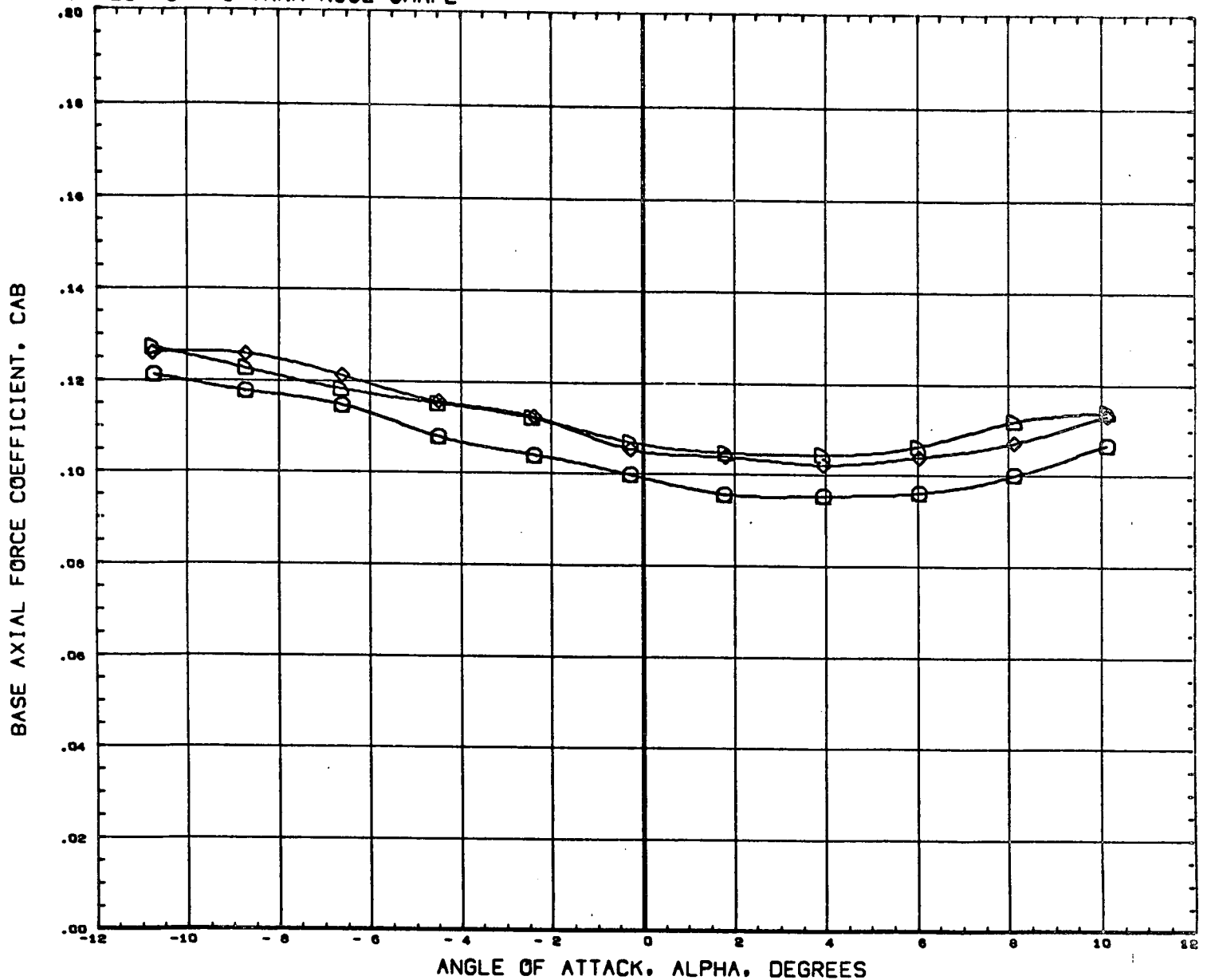
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.60

EFFECT OF HO TANK NOSE SHAPE



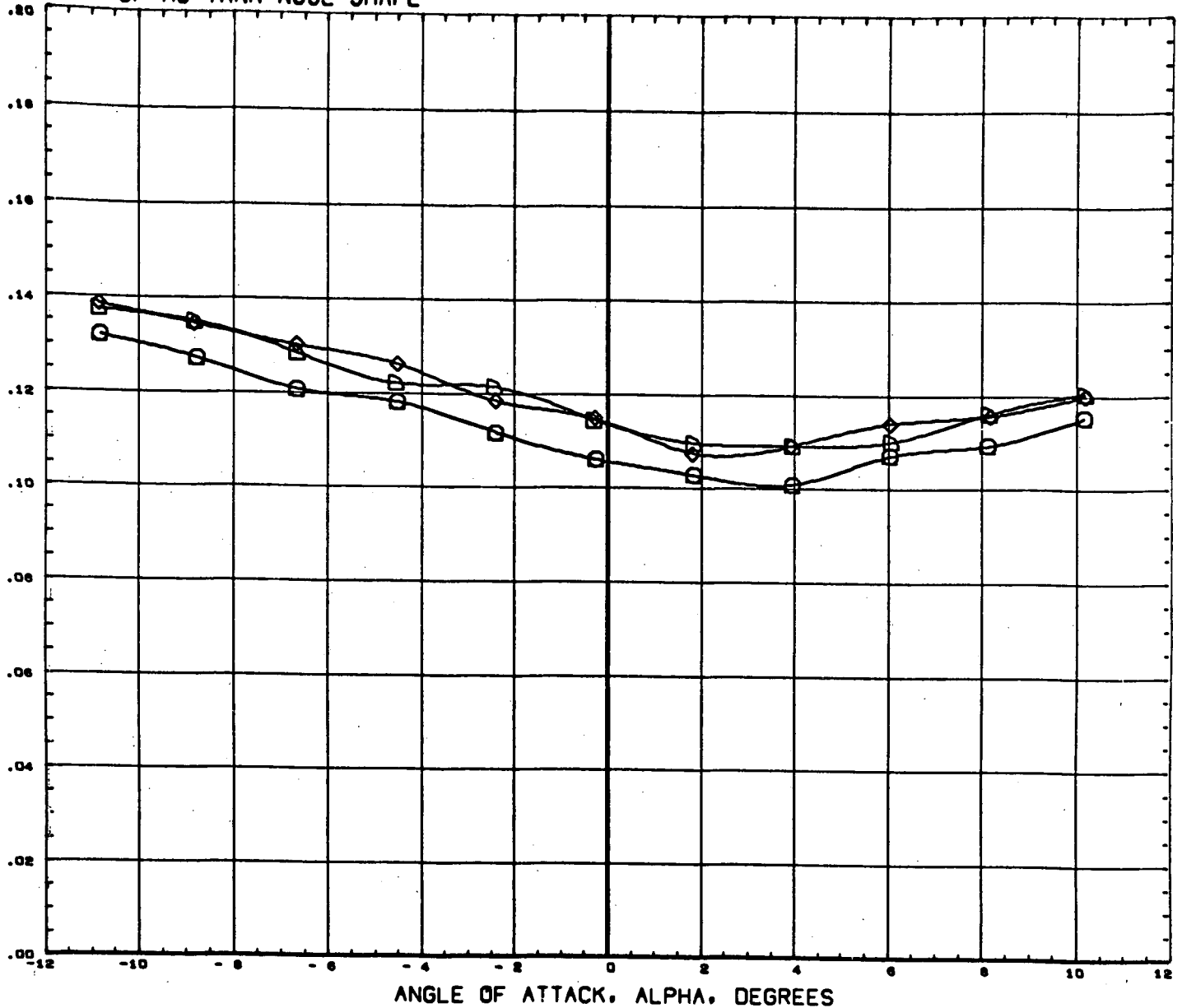
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | Y3 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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EFFECT OF HO TANK NOSE SHAPE

BASE AXIAL FORCE COEFFICIENT, C_{AB}



ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4800 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

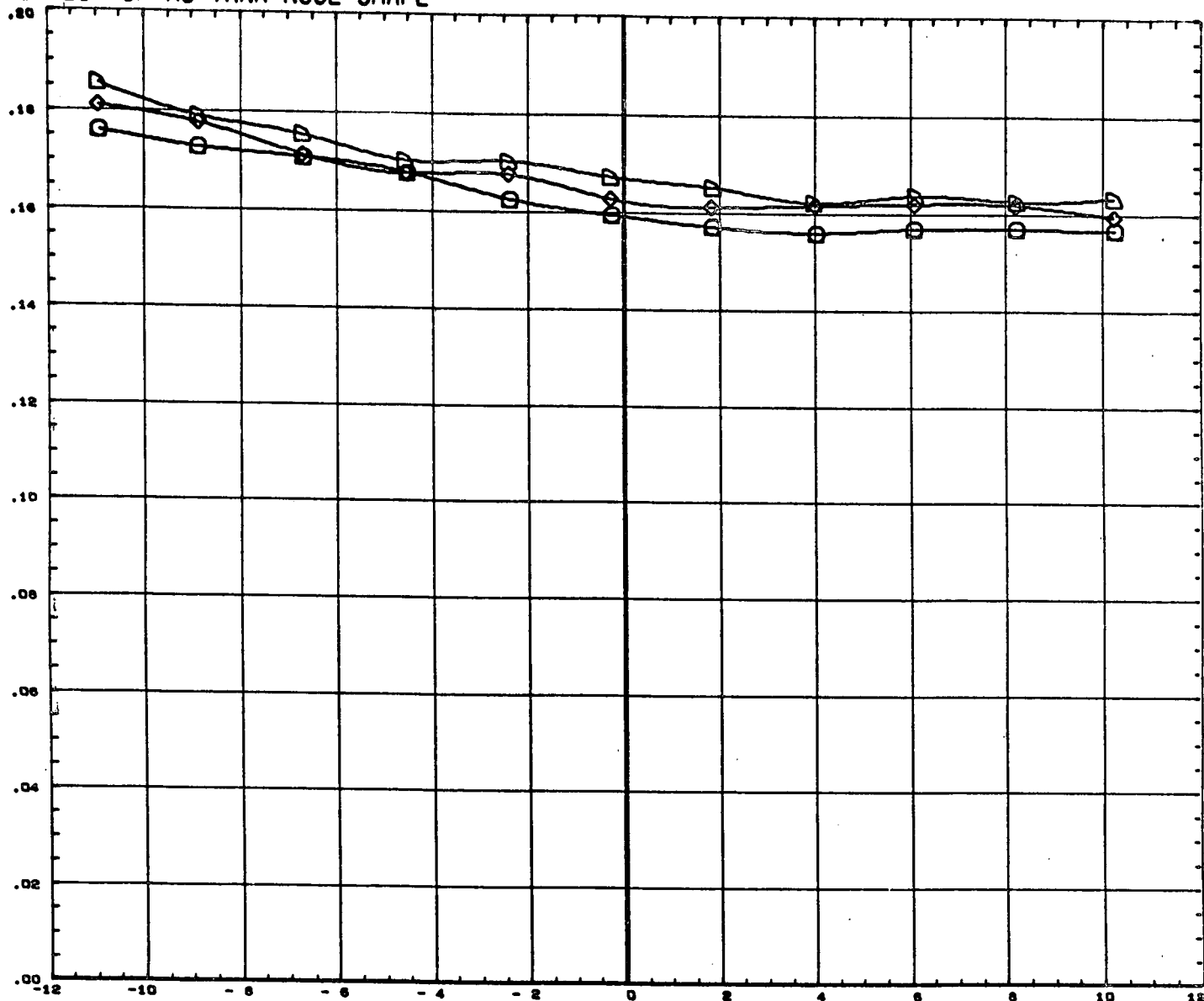
MACH

.90

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EFFECT OF NO TANK NOSE SHAPE

BASE AXIAL FORCE COEFFICIENT, CAB



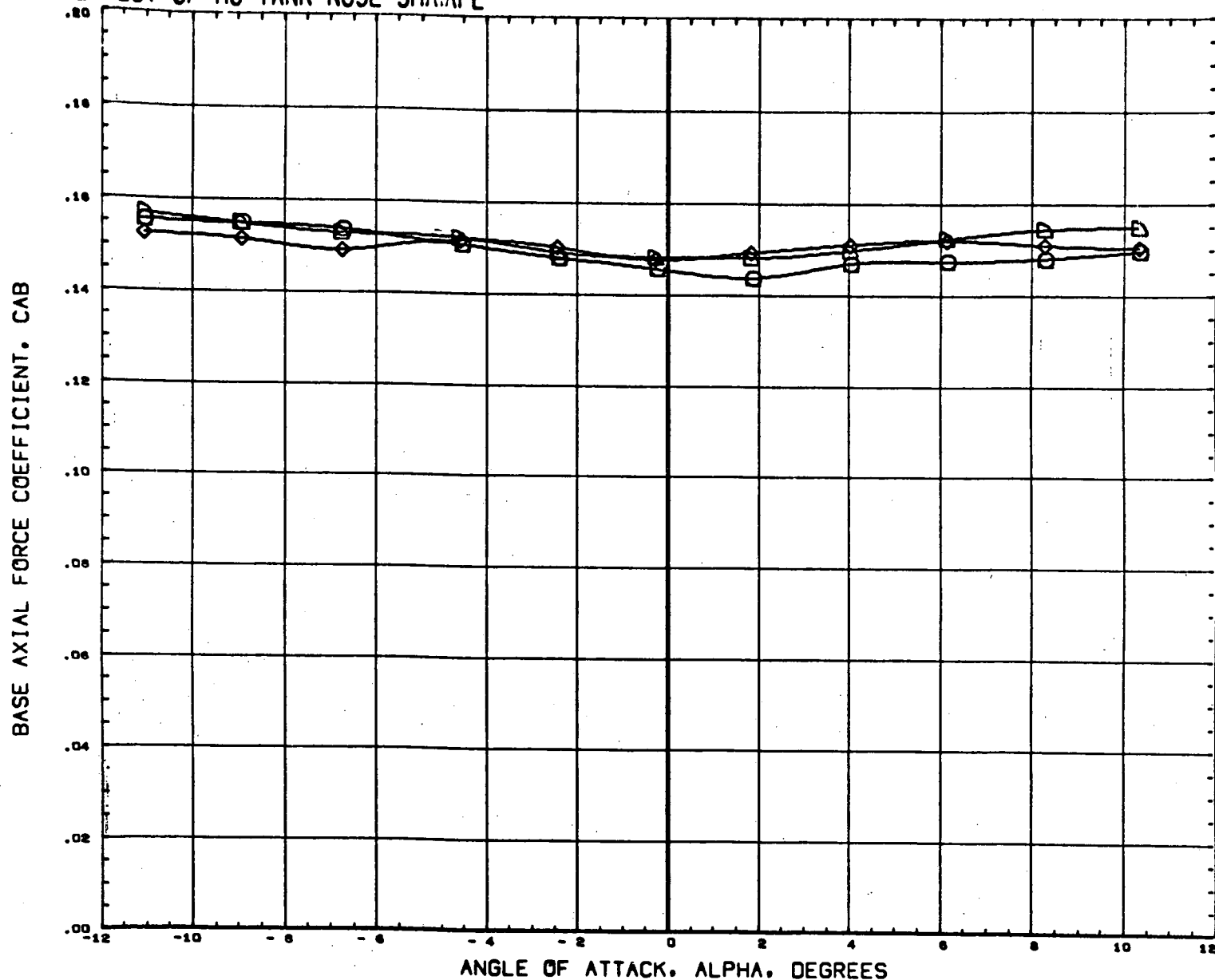
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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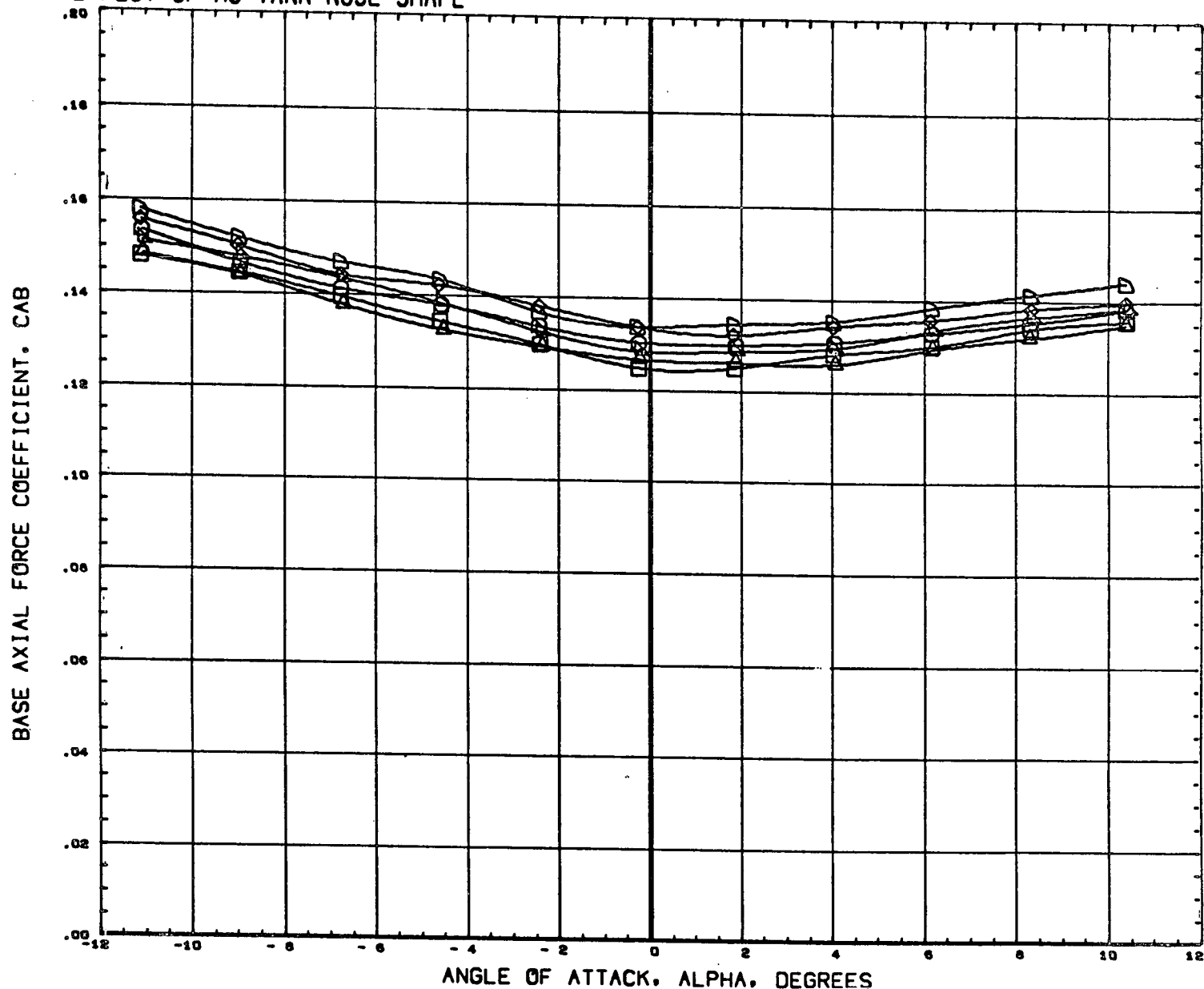
EFFECT OF NO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|--|--------|-------|--------|--------|-----------------------|
| (B71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH 1.10

EFFECT OF NO TANK NOSE SHAPE

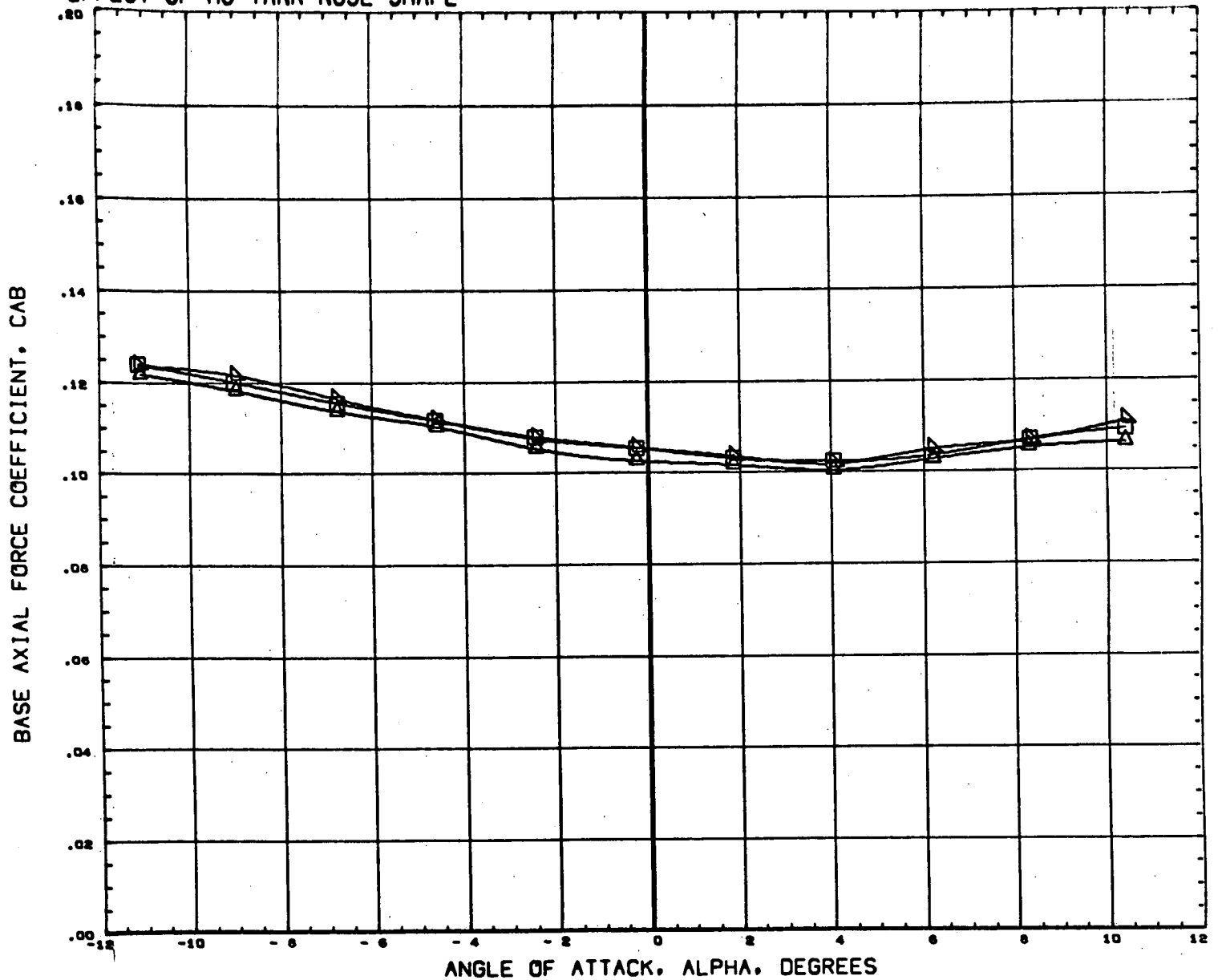


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XNRP | 3.3600 IN. |
| (B71125) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YNRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZNRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

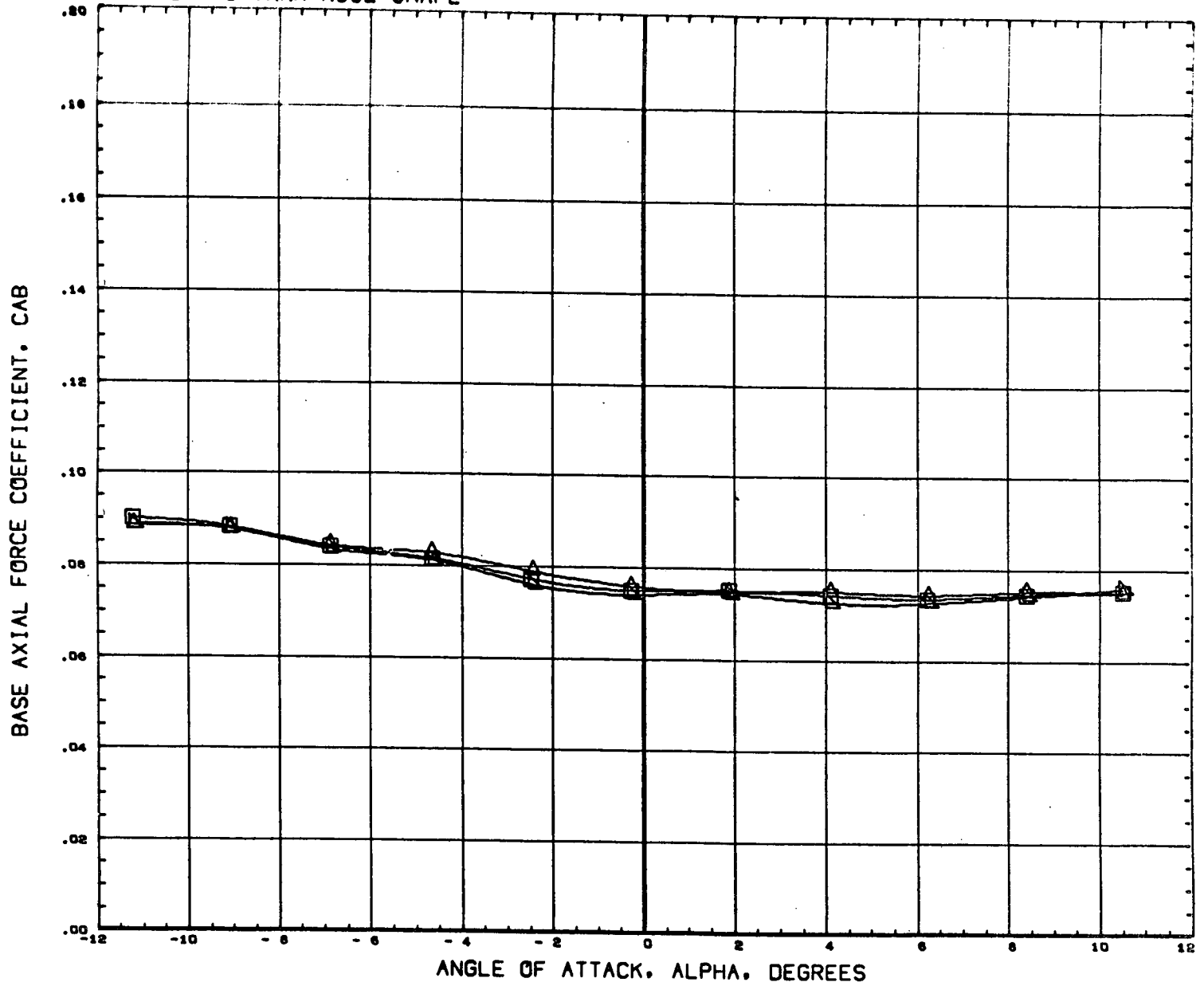
MACH

1.46

PAGE

47

EFFECT OF HO TANK NOSE SHAPE

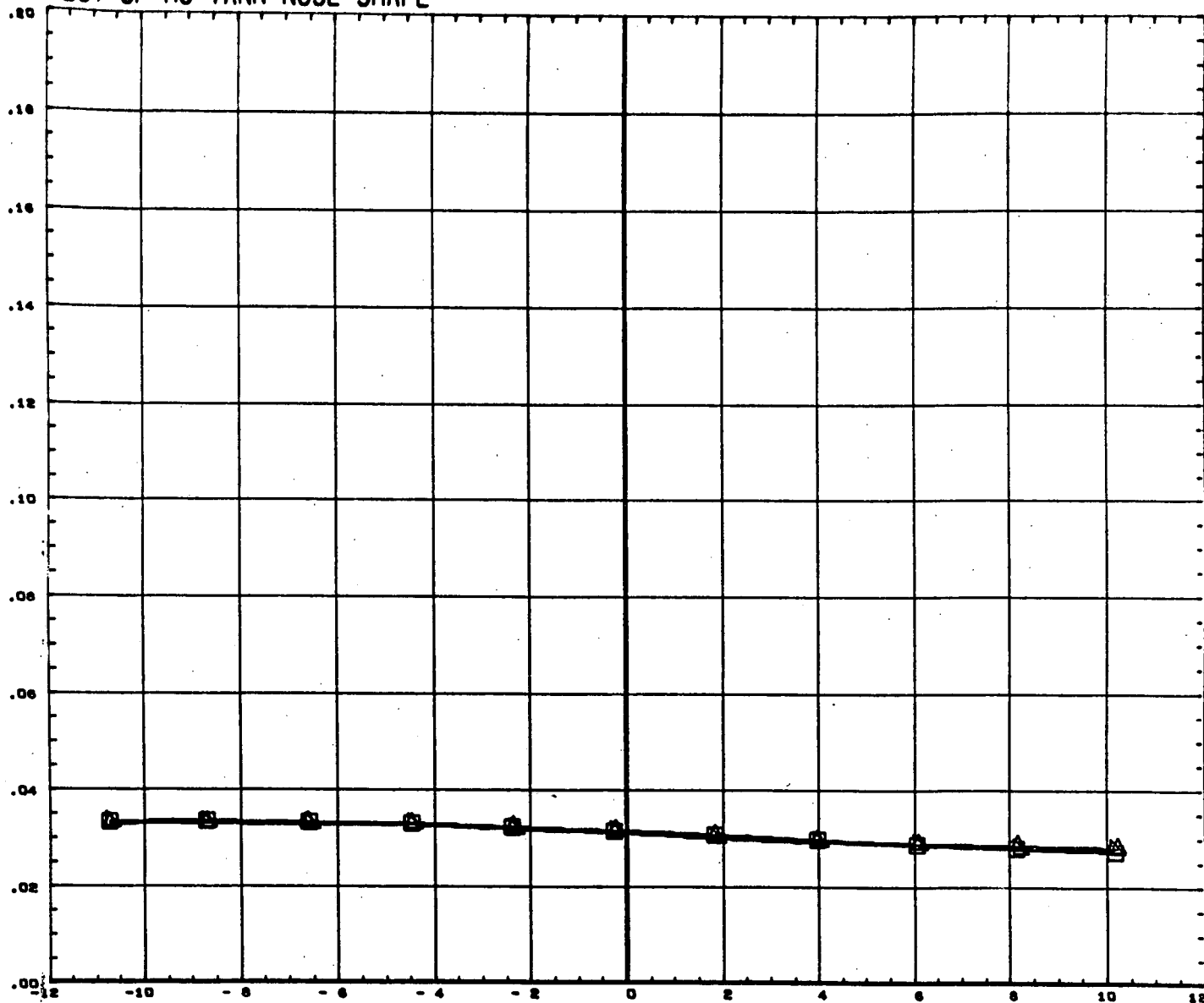


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRF | 0.0000 IN. |
| (871127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

EFFECT OF HO TANK NOSE SHAPE

BASE AXIAL FORCE COEFFICIENT, CAB



ANGLE OF ATTACK, ALPHA, DEGREES

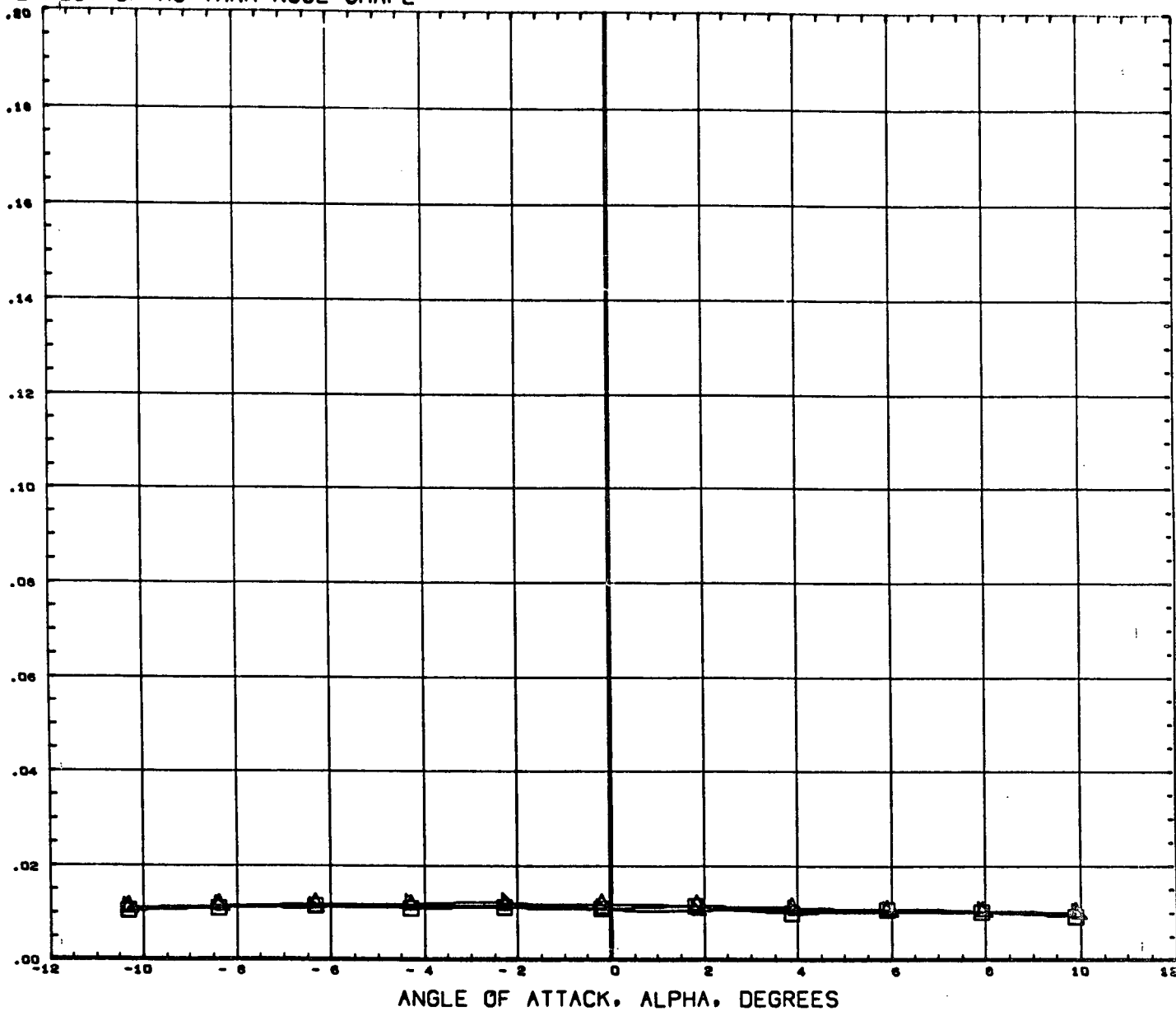
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|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF HO TANK NOSE SHAPE

BASE AXIAL FORCE COEFFICIENT, CAB

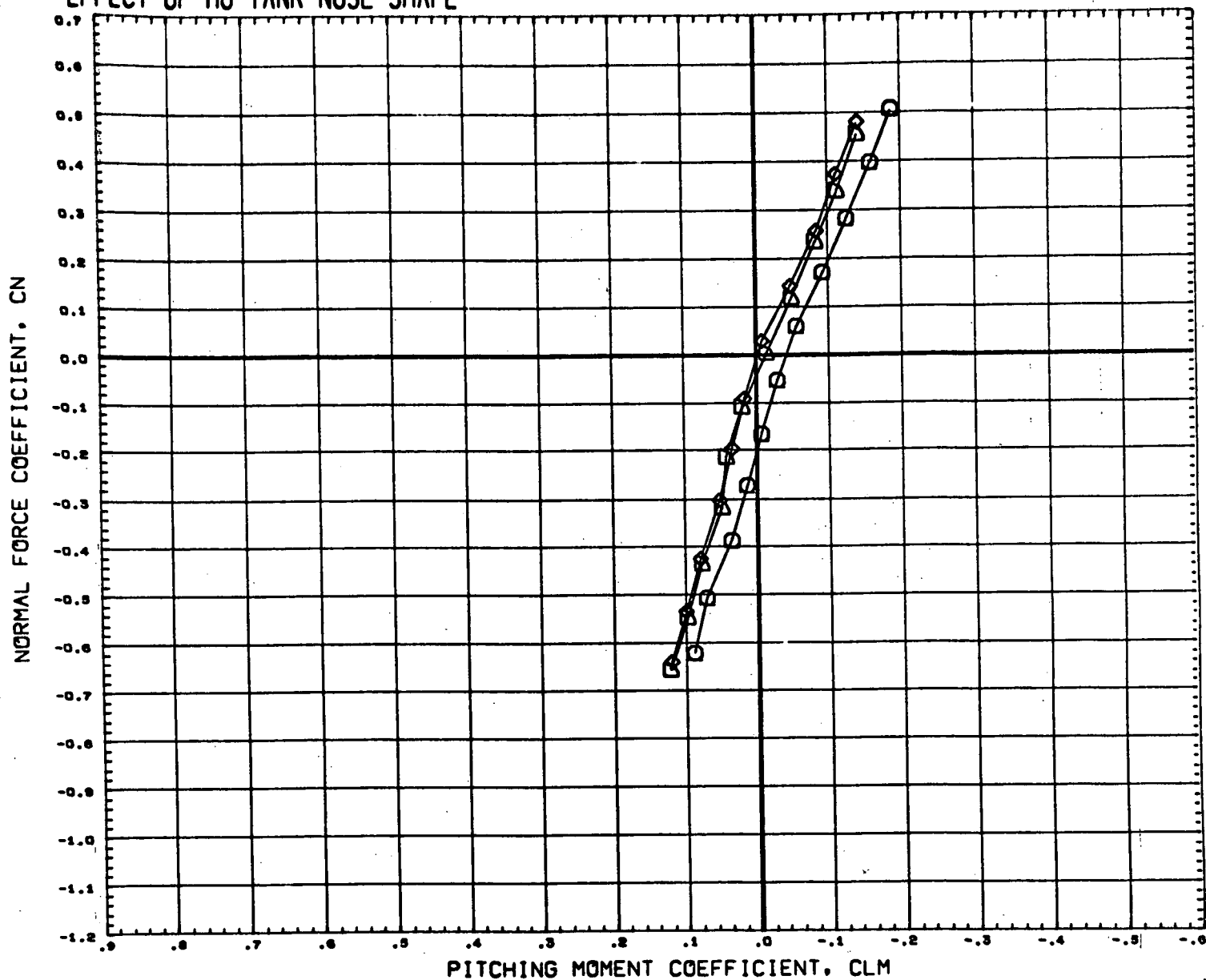


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF HQ TANK NOSE SHAPE

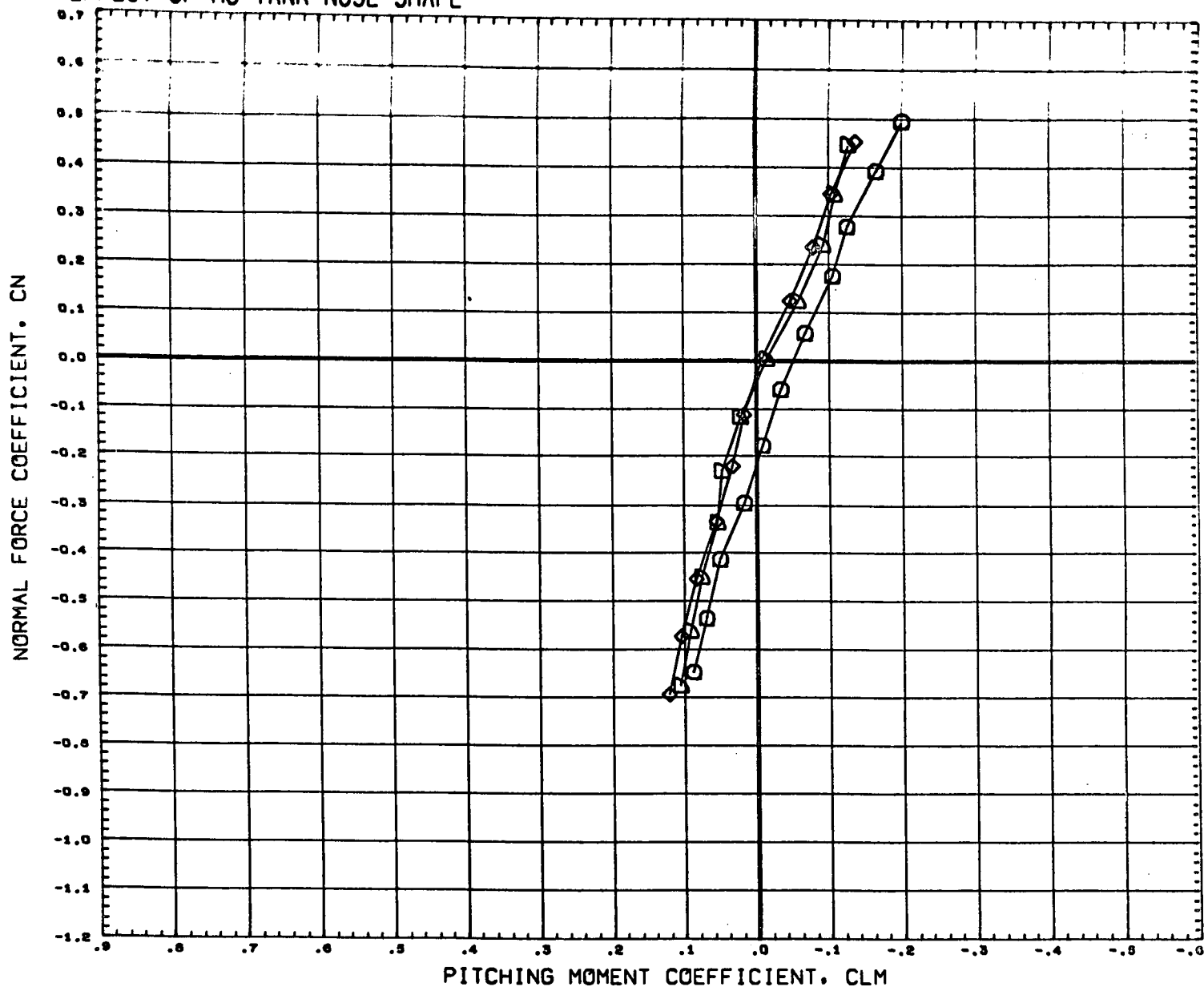


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T601S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF NO TANK NOSE SHAPE

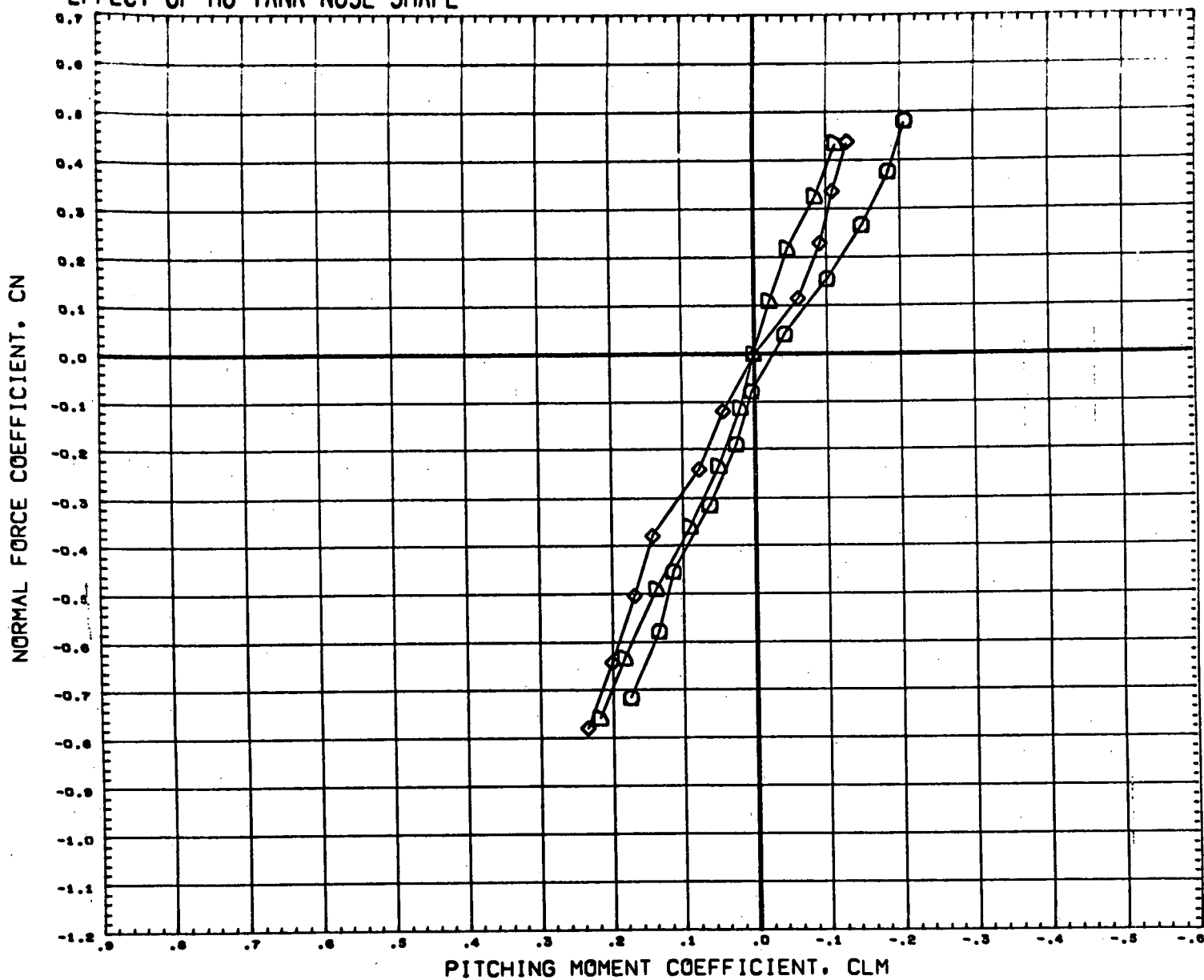


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4800 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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EFFECT OF HO TANK NOSE SHAPE

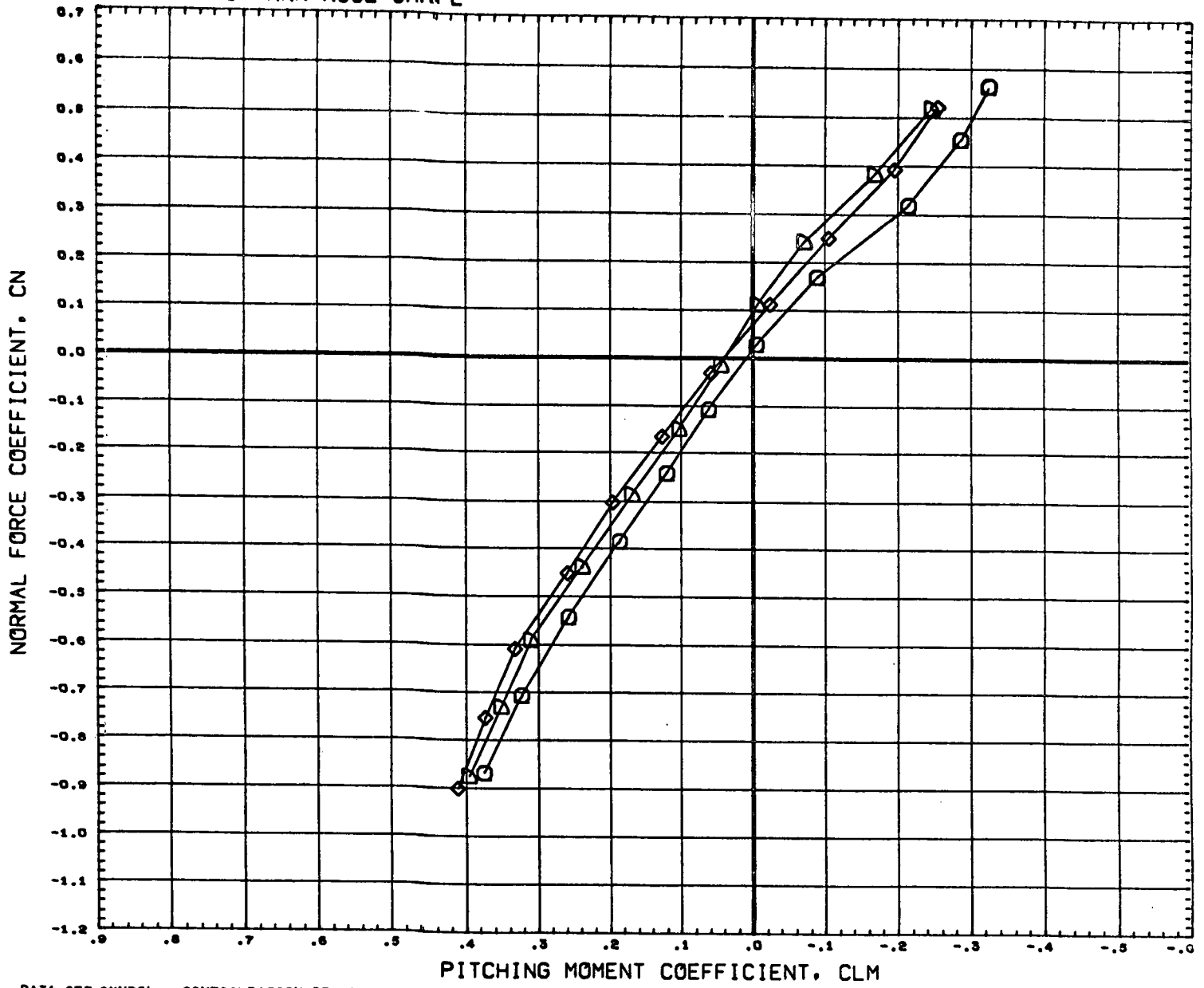


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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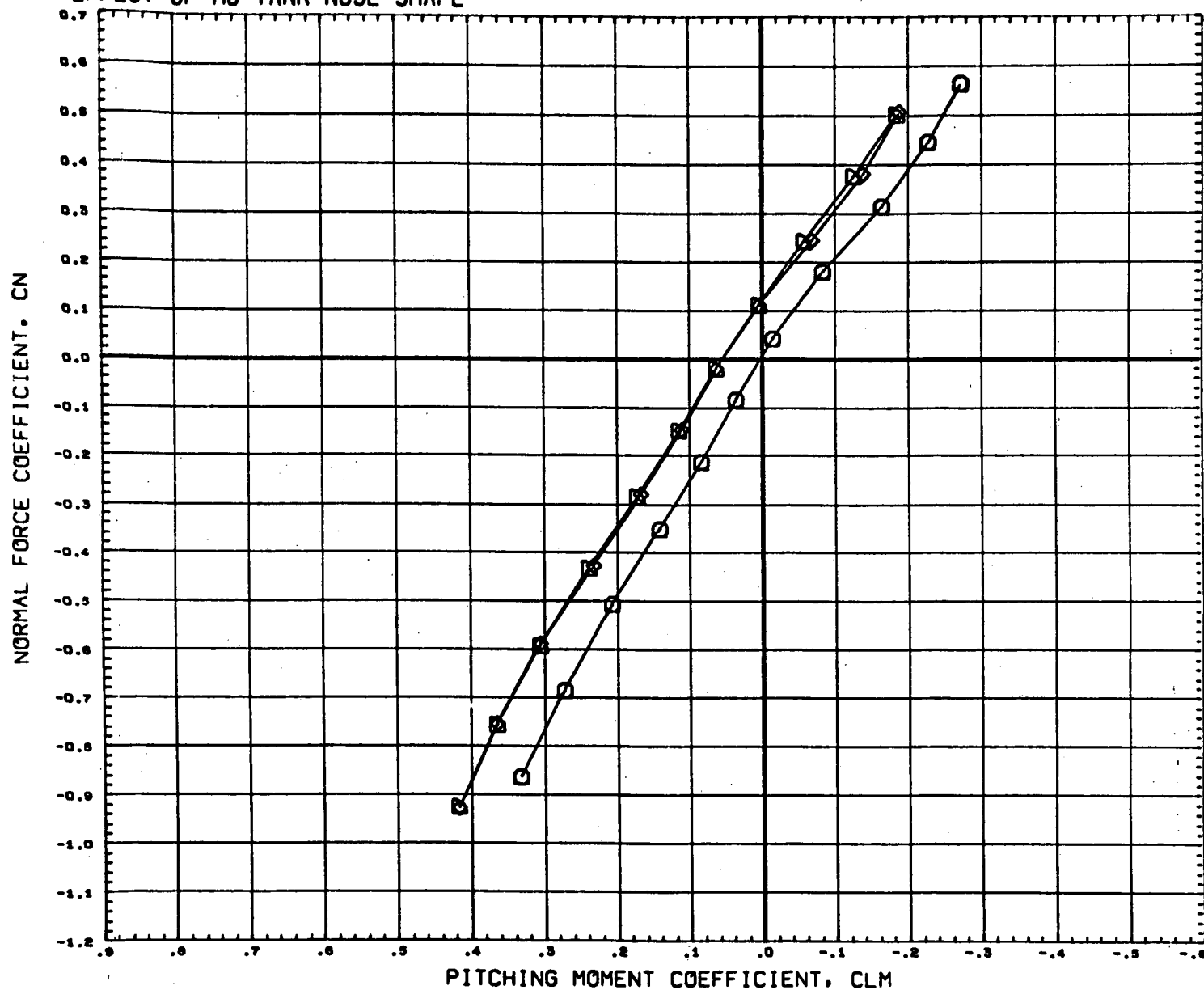
EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

EFFECT OF NO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

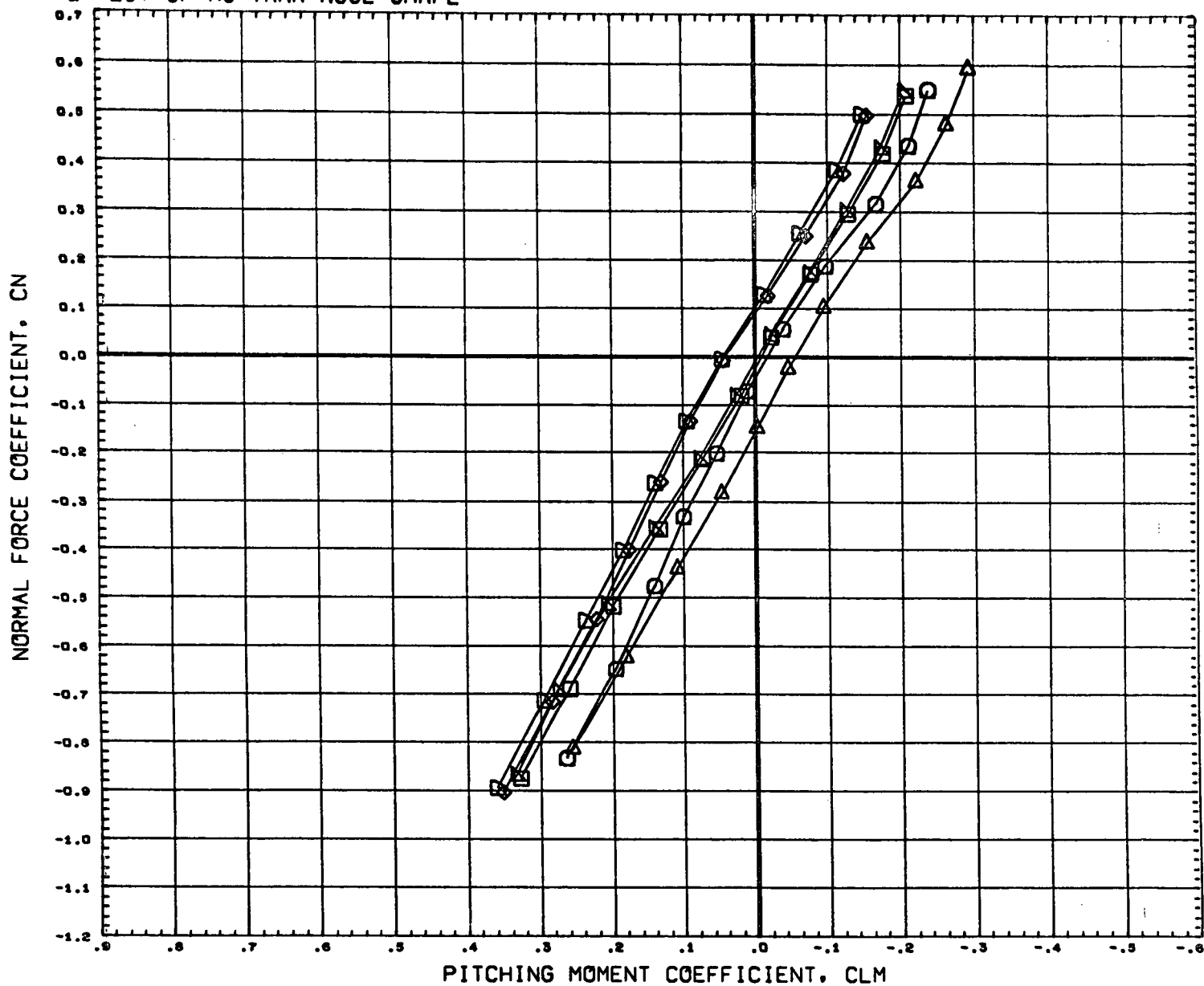
MACH

1.10

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EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

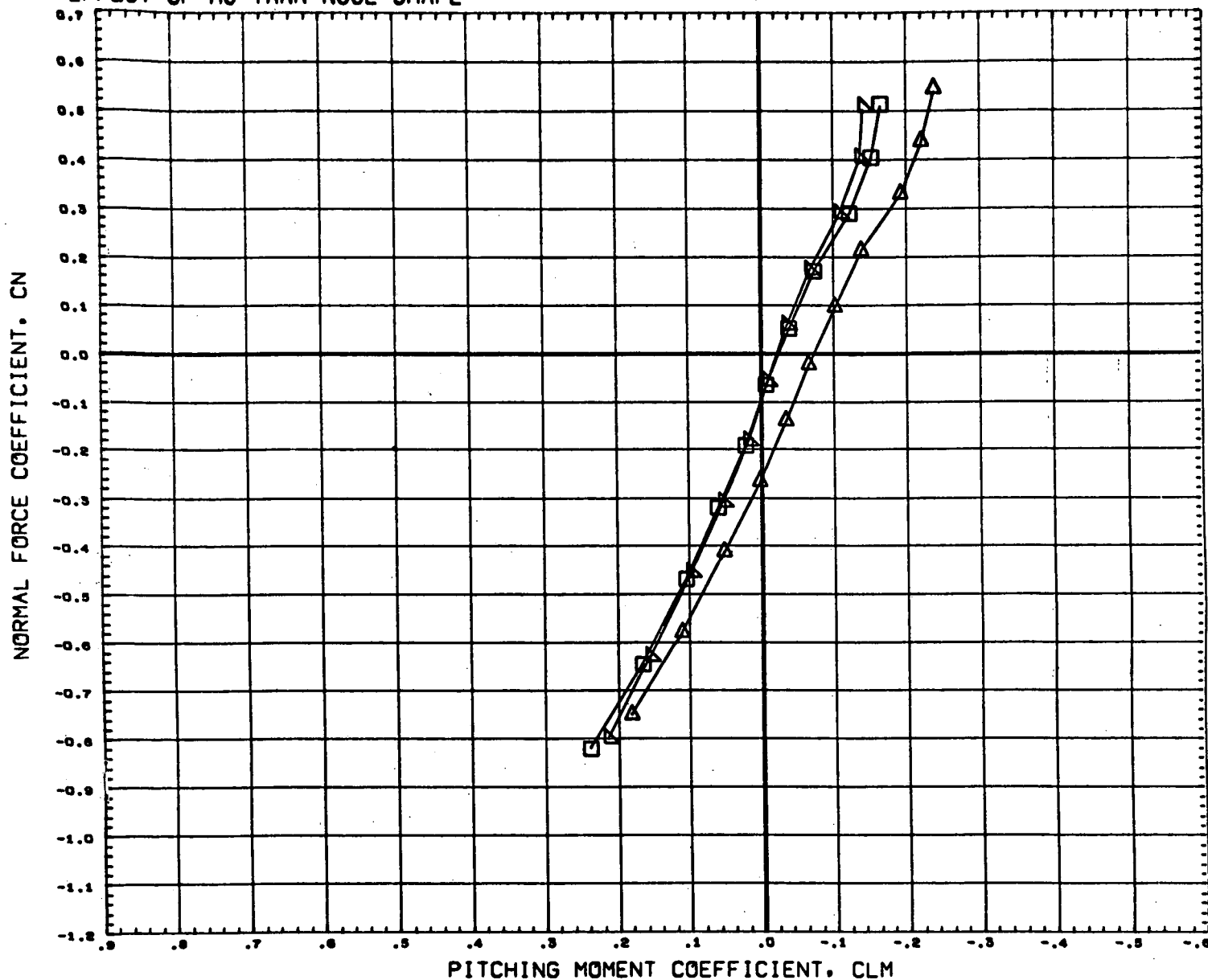
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EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|--|--------|-------|--------|--------|-----------------------|--------|---------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 | SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 | IN. |
| (871121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 | IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 | IN. |
| (871127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

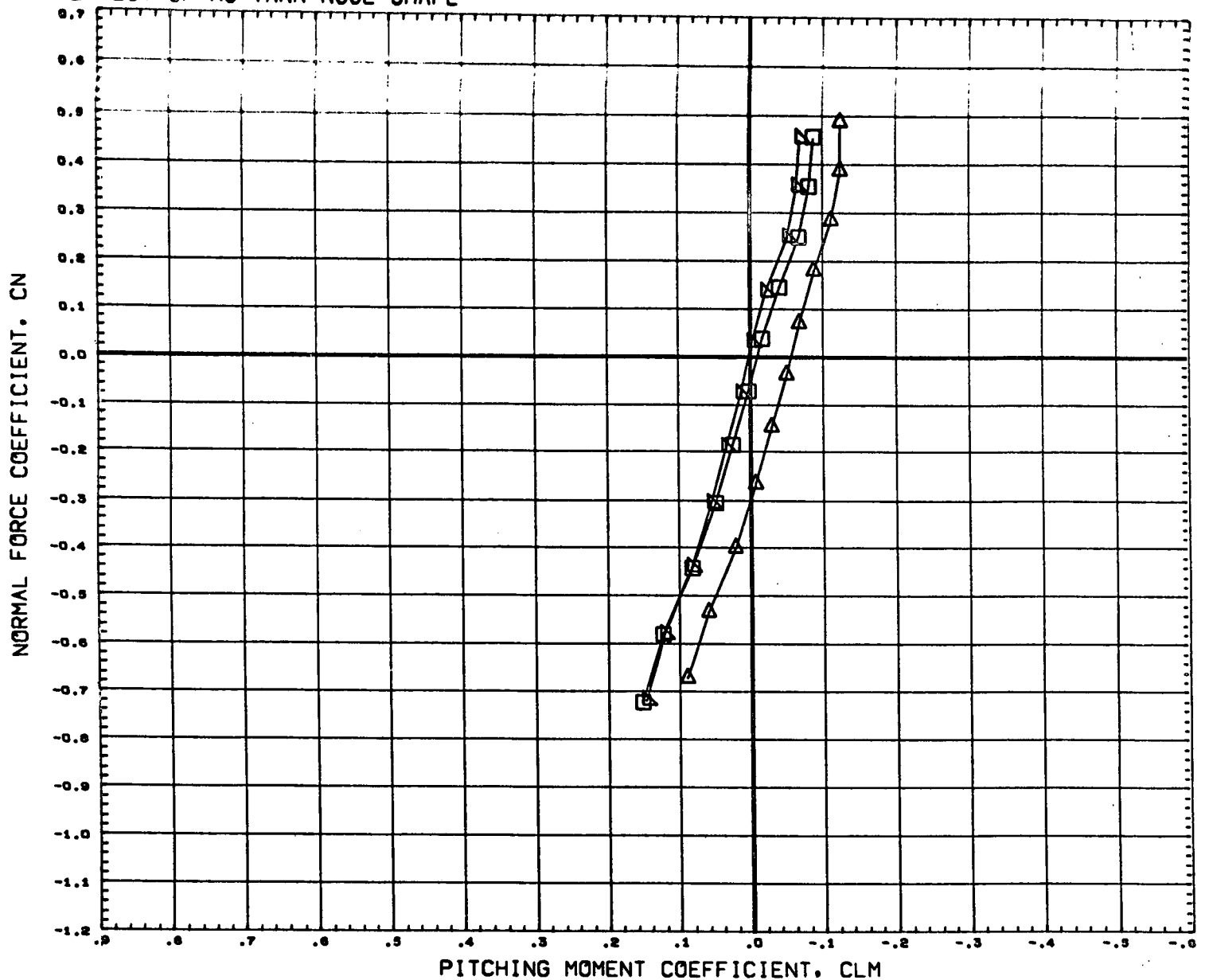
MACH

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EFFECT OF NO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

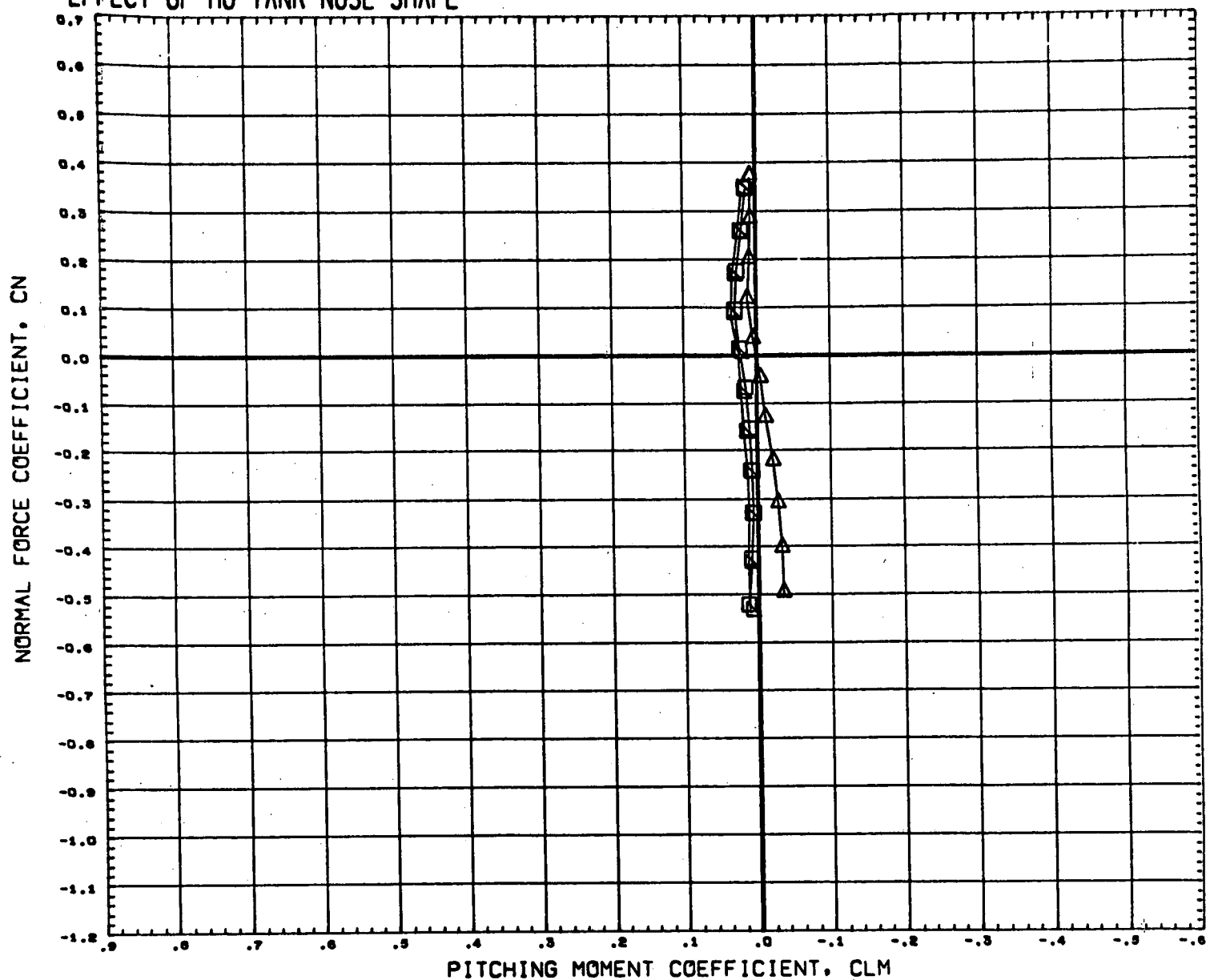
MACH

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EFFECT OF HO TANK NOSE SHAPE

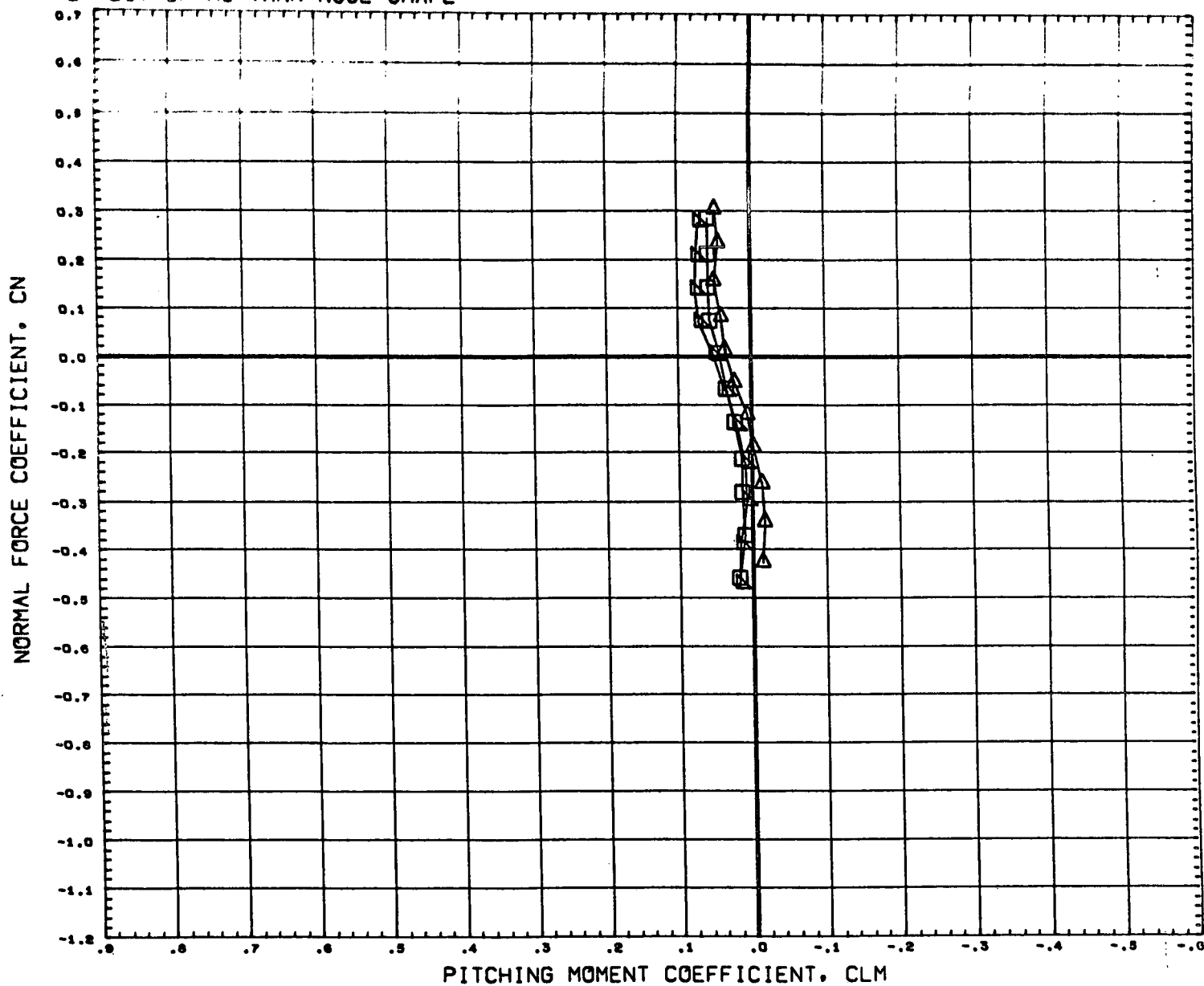


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71123) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71125) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871121) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4800 IN. |
| (871123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (871125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (871127) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

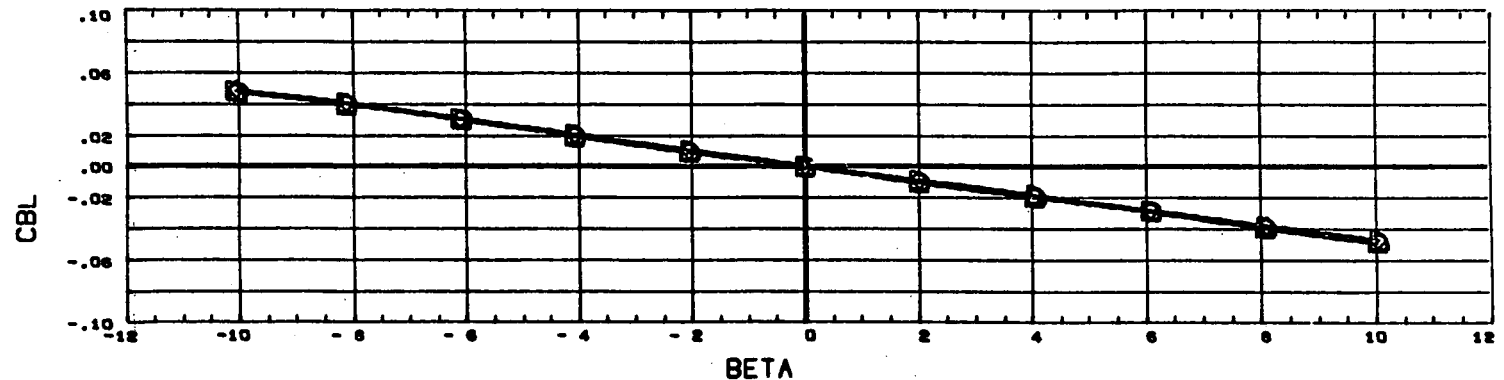
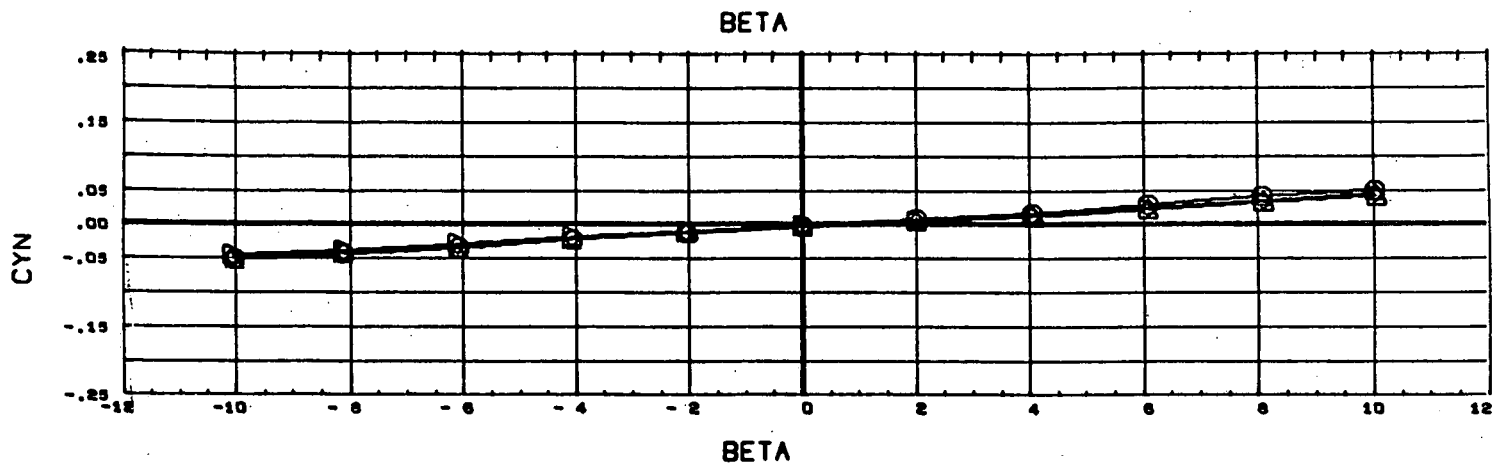
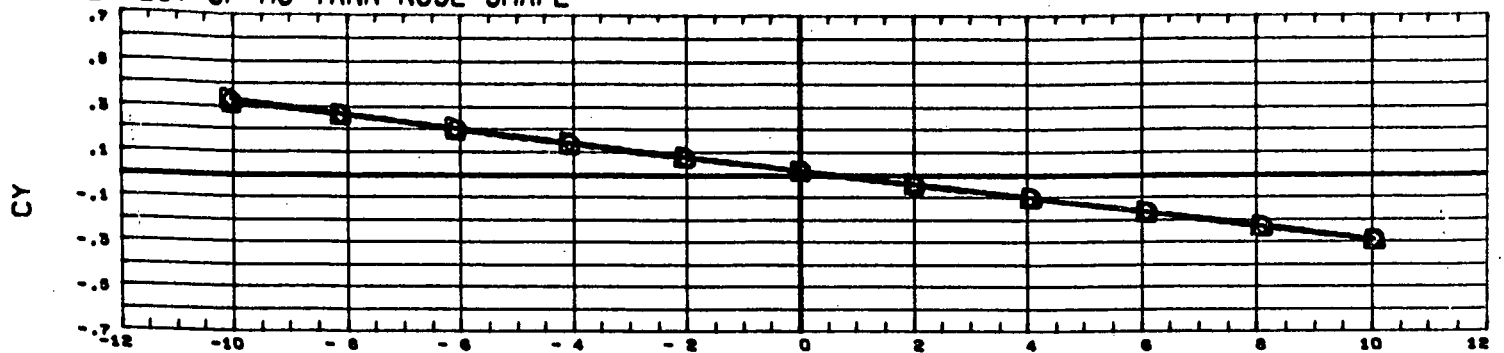
MACH

4.96

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EFFECT OF HO TANK NOSE SHAPE

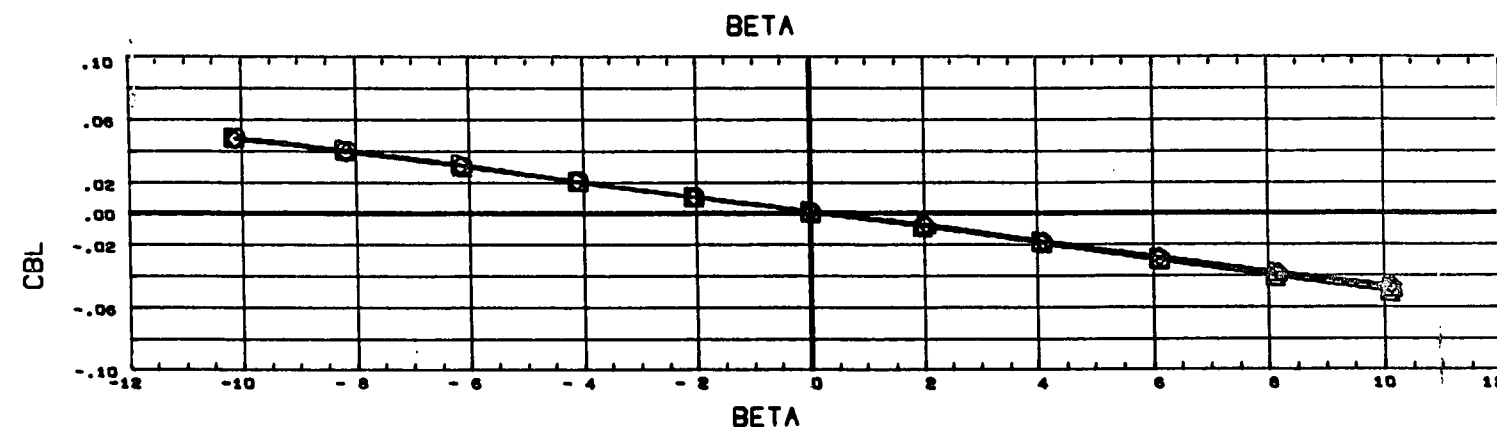
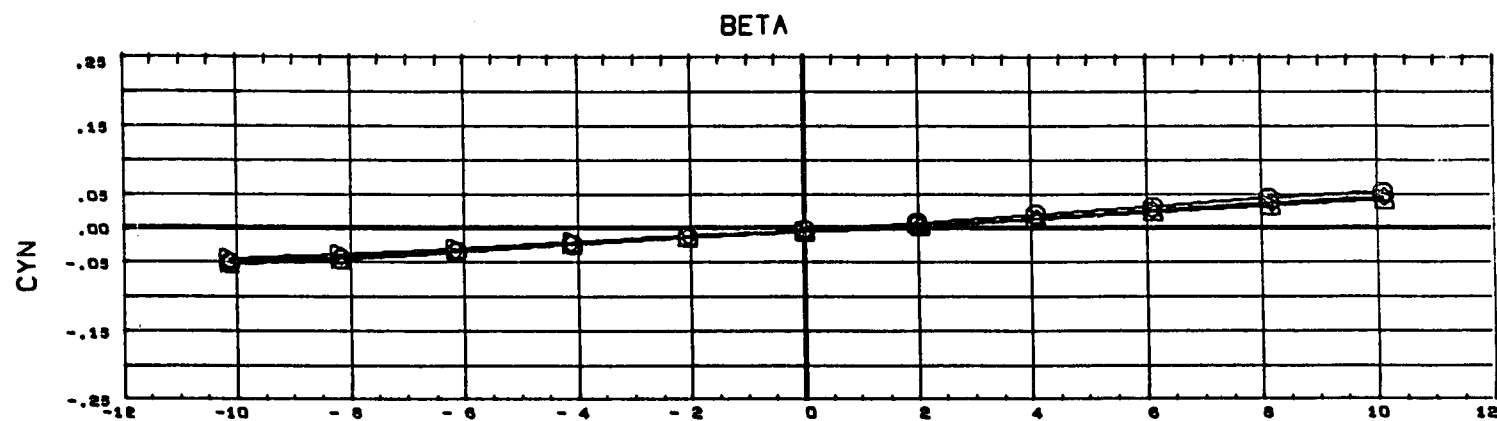
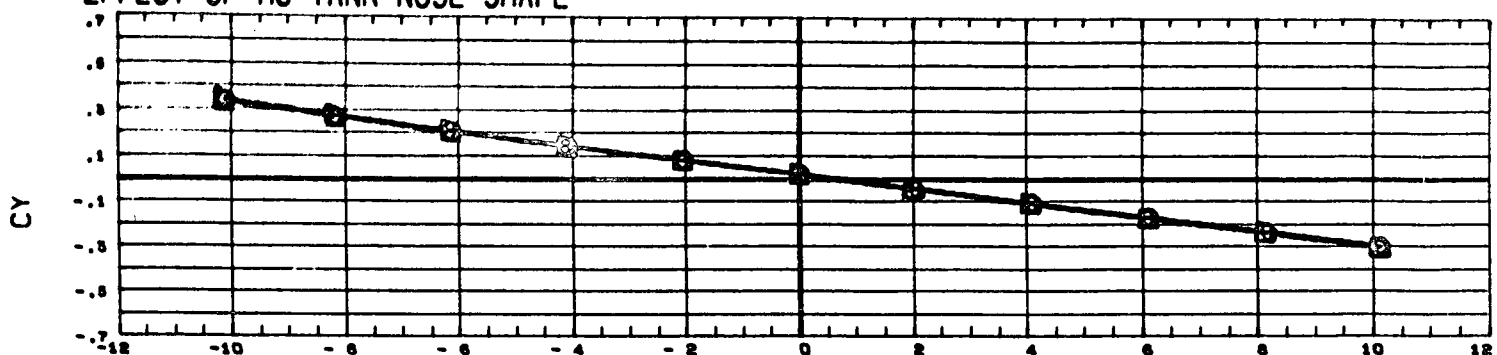


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| (A71126) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YHRP | 0.0000 IN. |
| (A71128) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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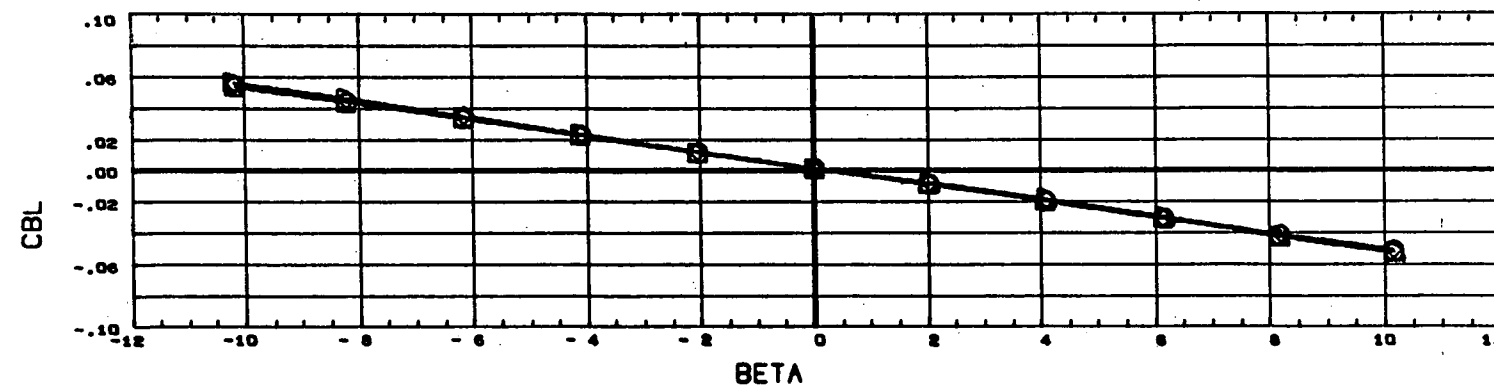
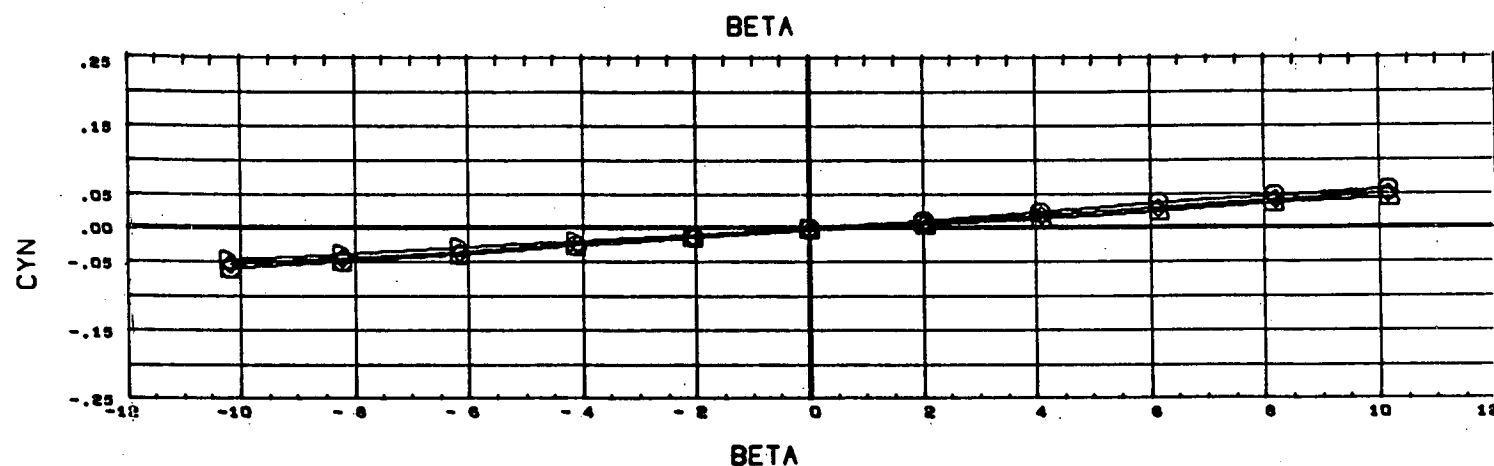
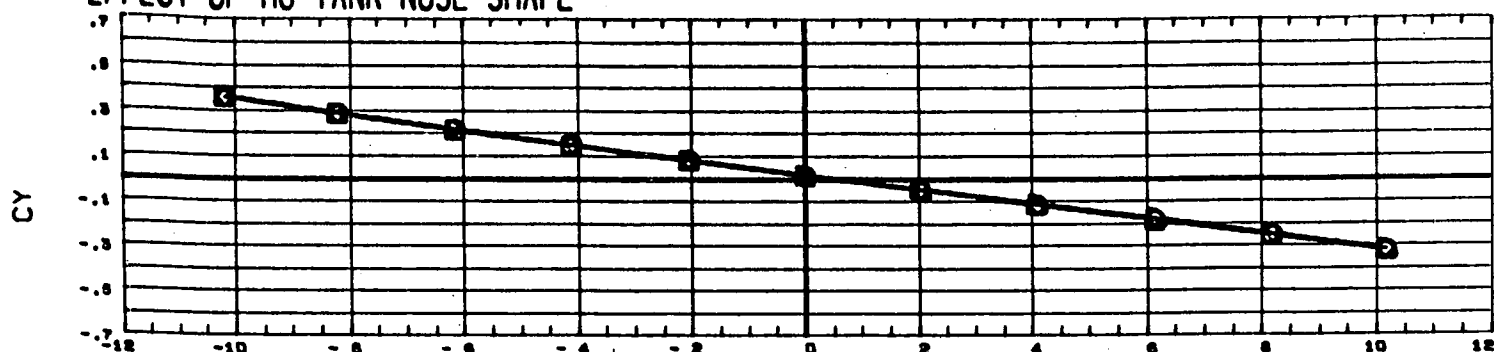
EFFECT OF NO TANK NOSE SHAPE



| DATA SET | SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|----------|--------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DREF | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71122) | | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71126) | | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | | | SCALE |

MACH .80

EFFECT OF HO TANK NOSE SHAPE

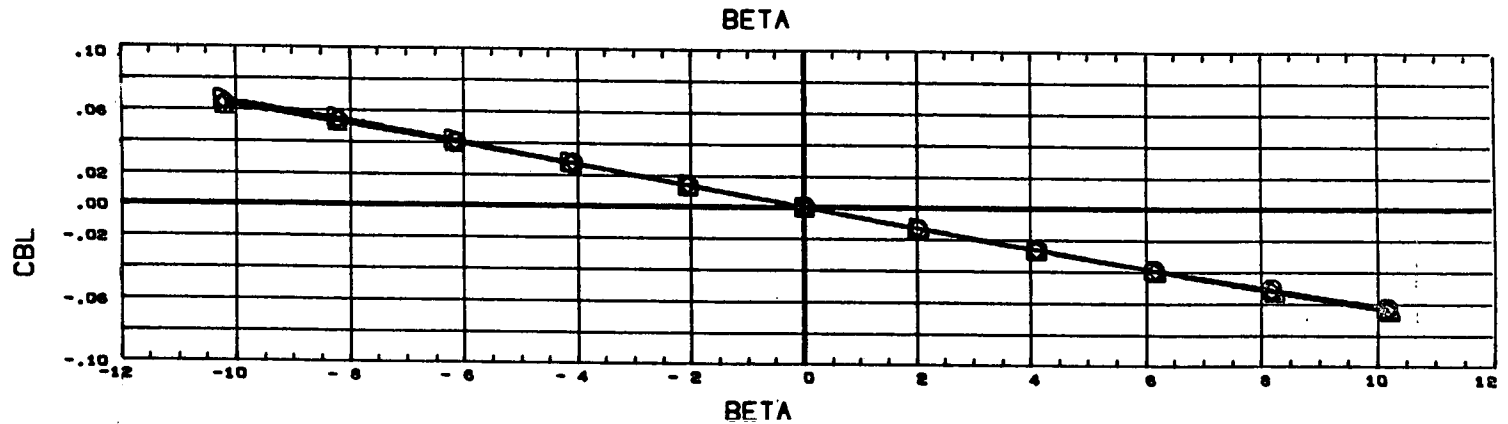
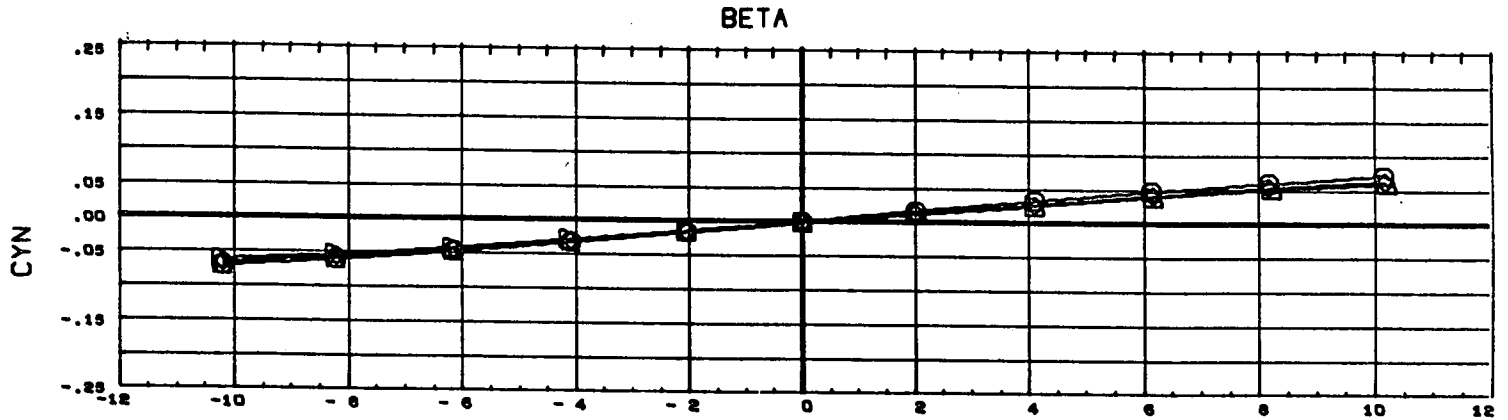
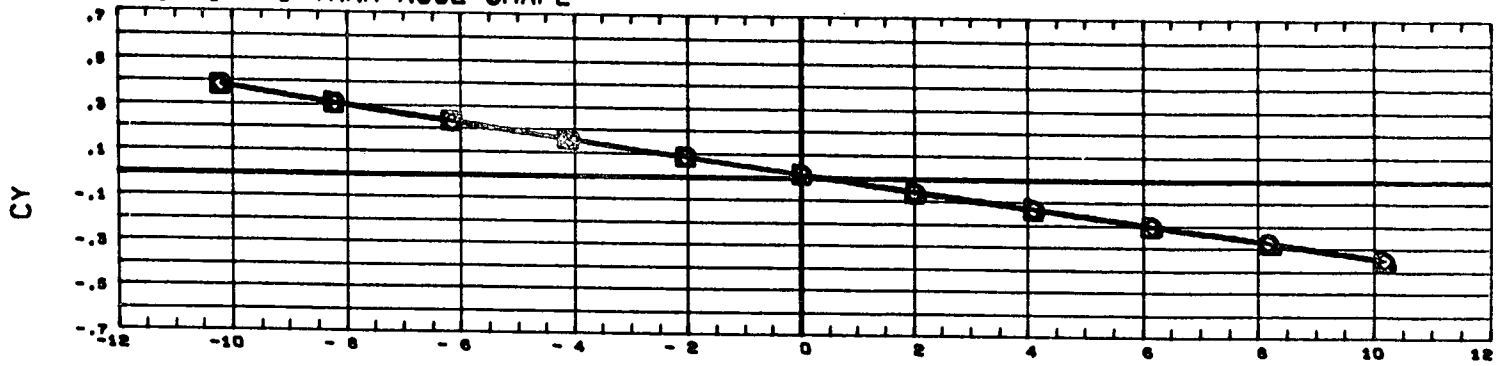


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|--|--------|-------|--------|--------|-----------------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.6600 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0260 IN. |
| (A71122) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF 4.4600 IN. |
| (A71124) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| (A71126) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP 0.0000 IN. |
| (A71128) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP 0.2460 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH .90

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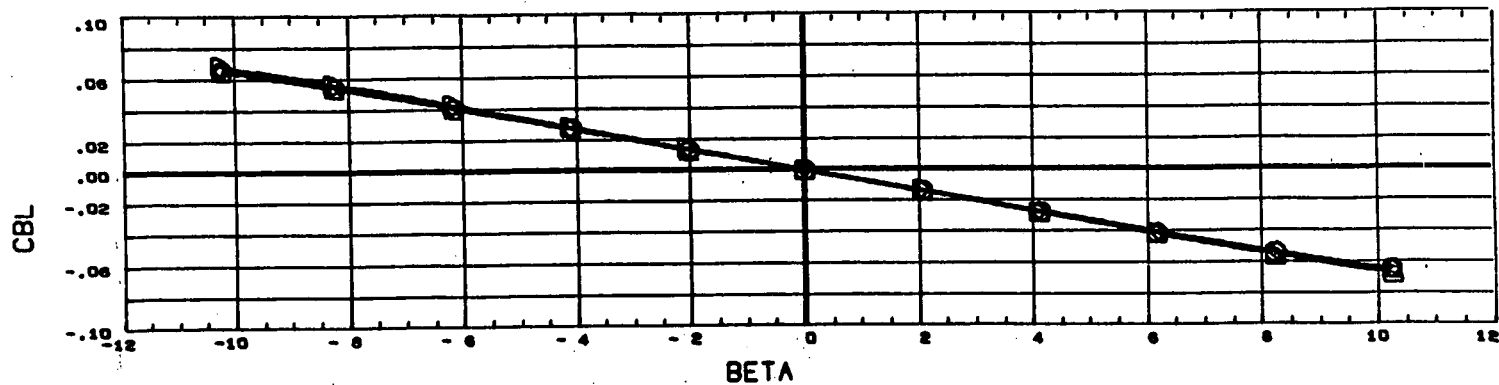
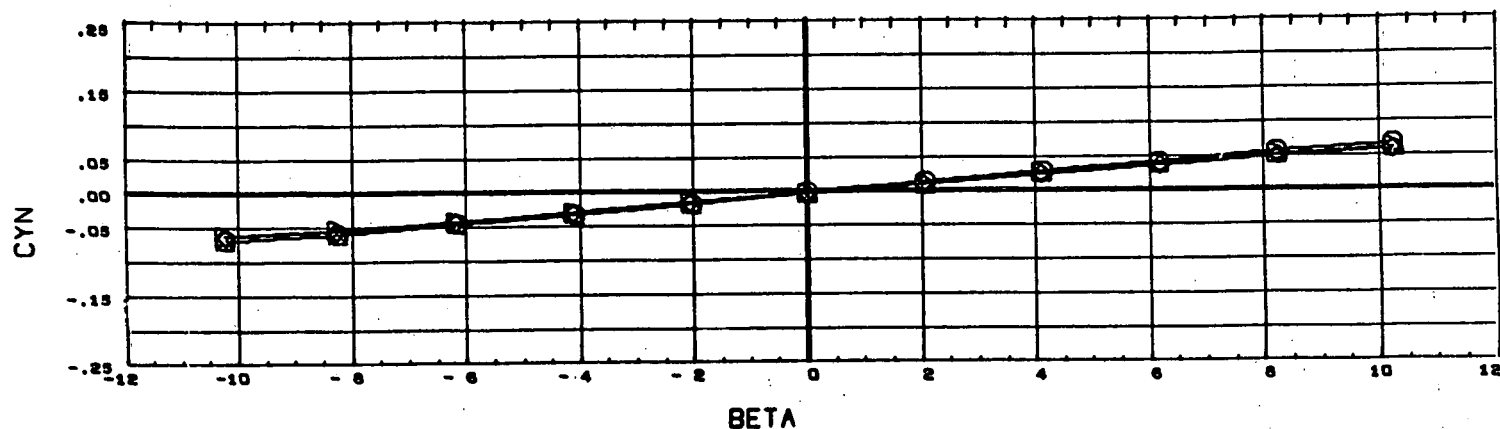
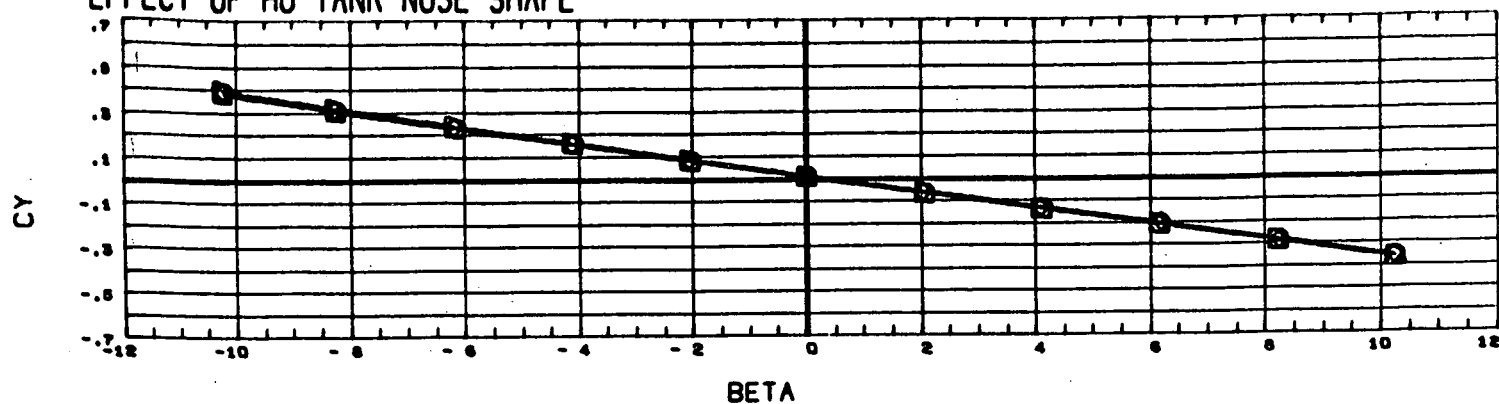
EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71128) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

EFFECT OF HO TANK NOSE SHAPE

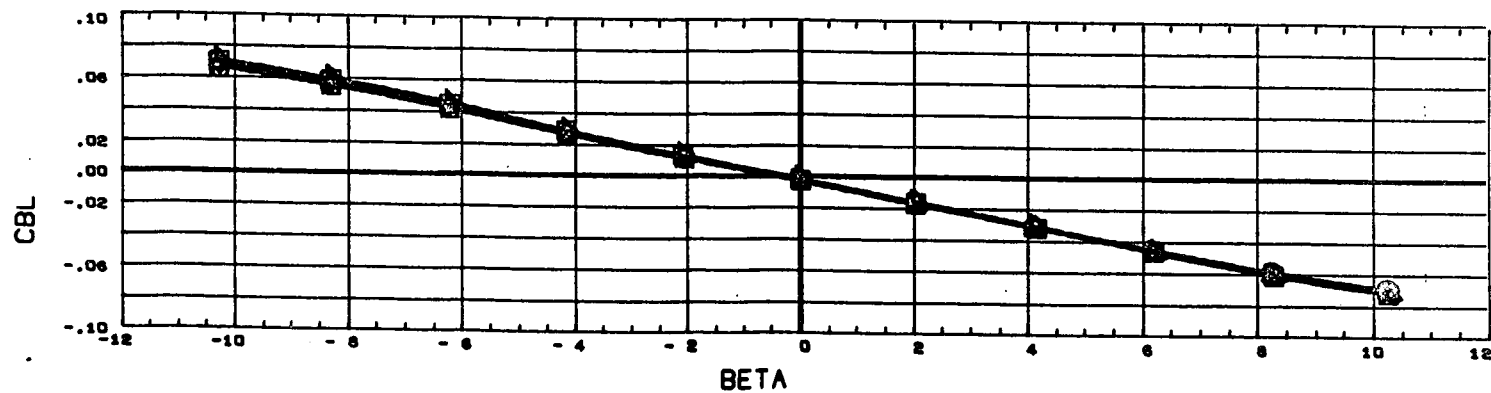
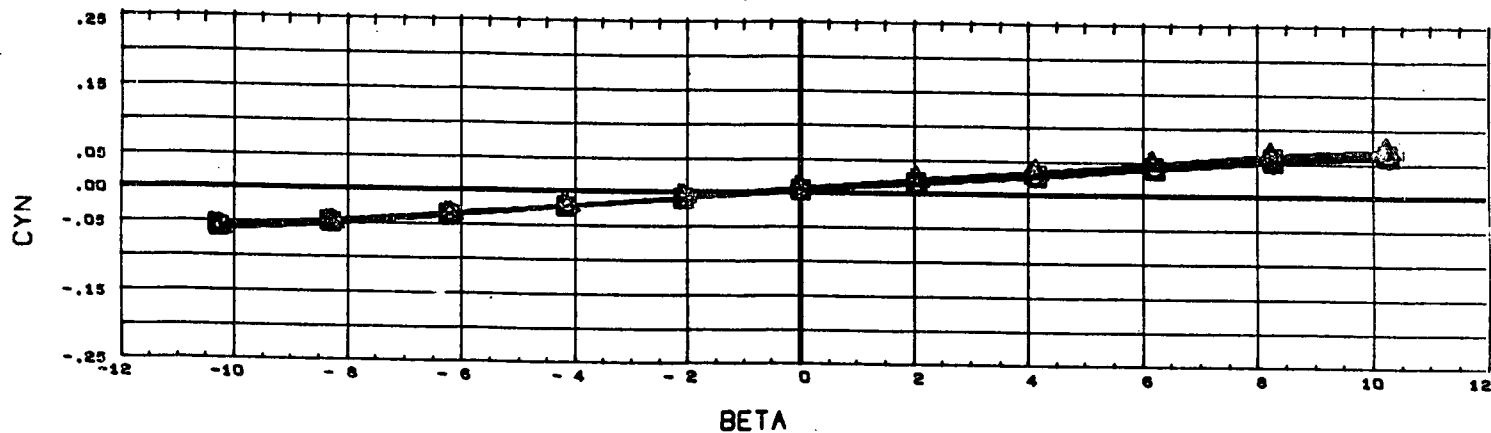
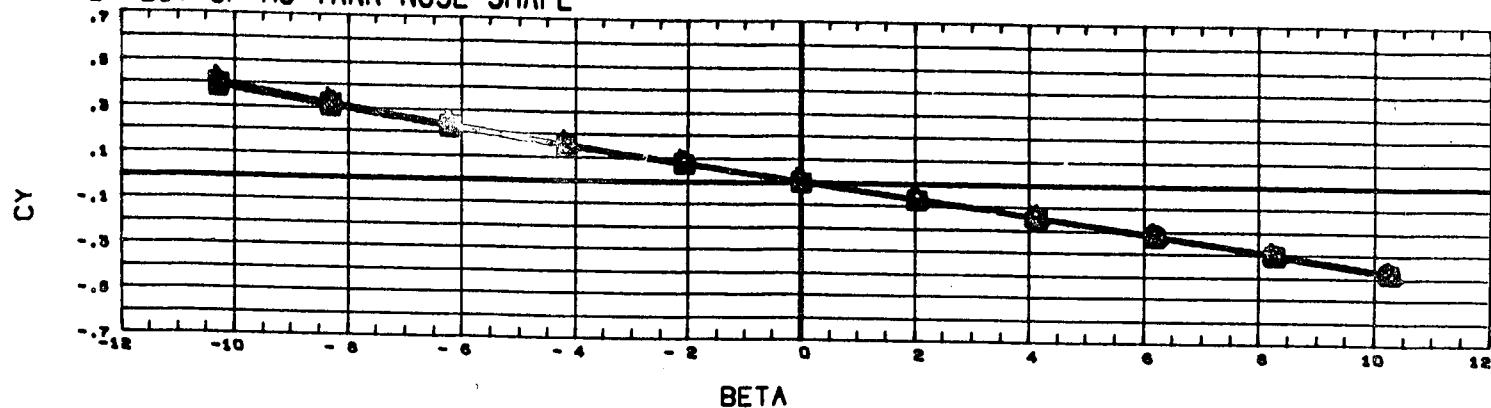


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71128) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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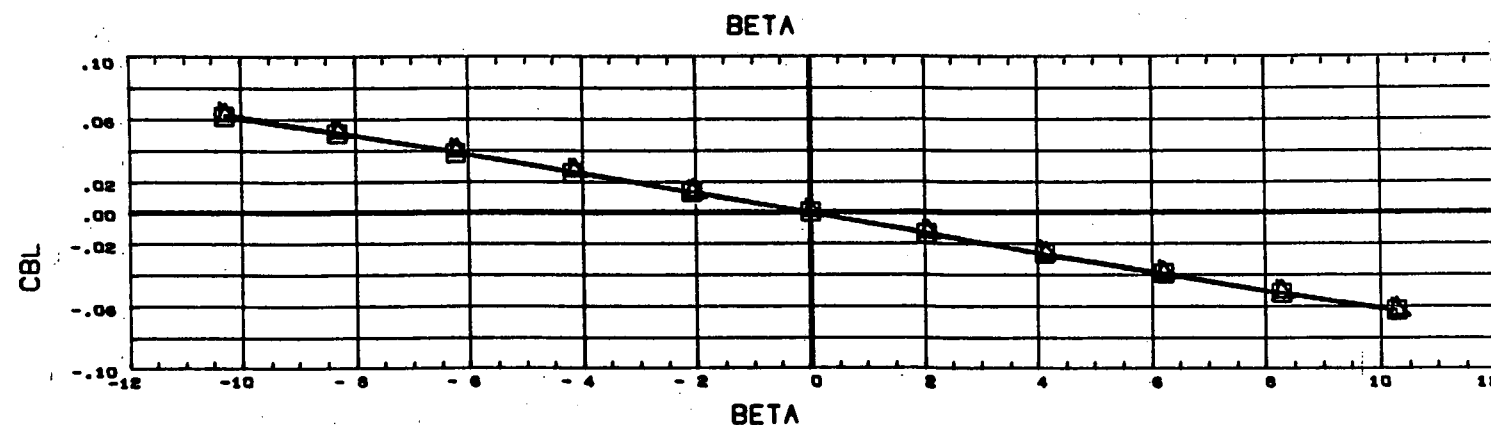
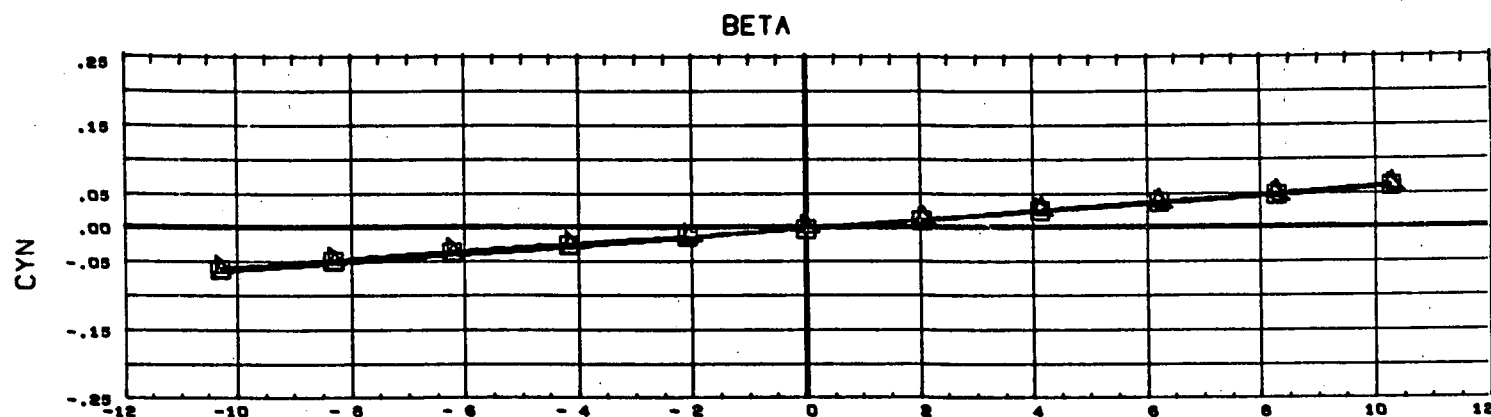
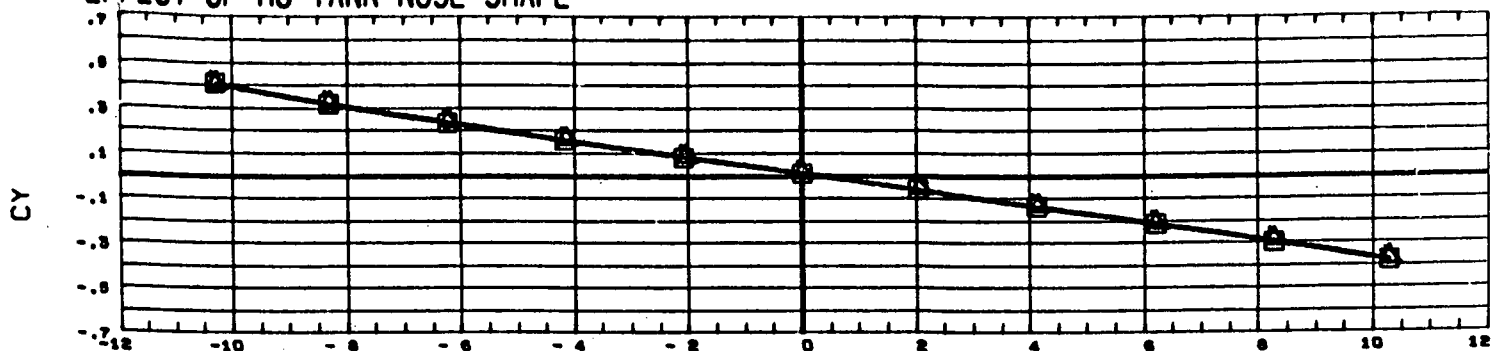
EFFECT OF NO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71128) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

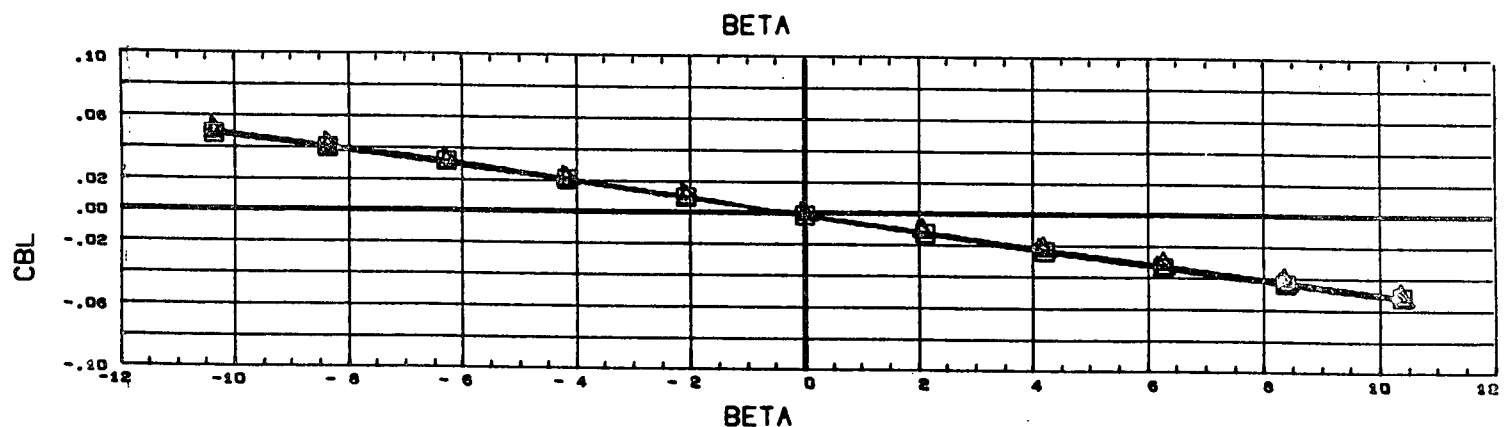
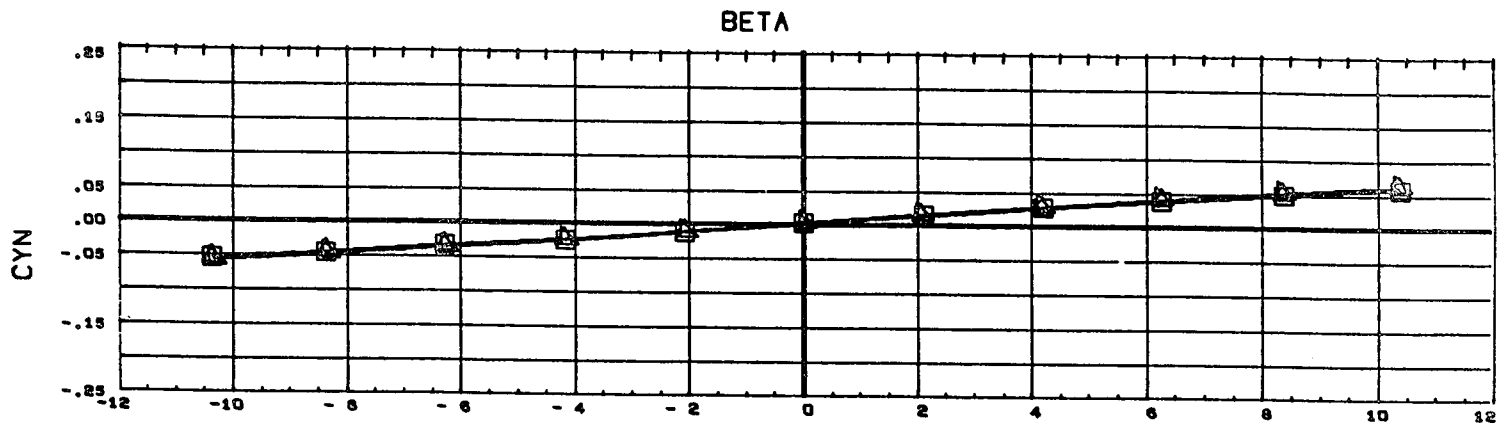
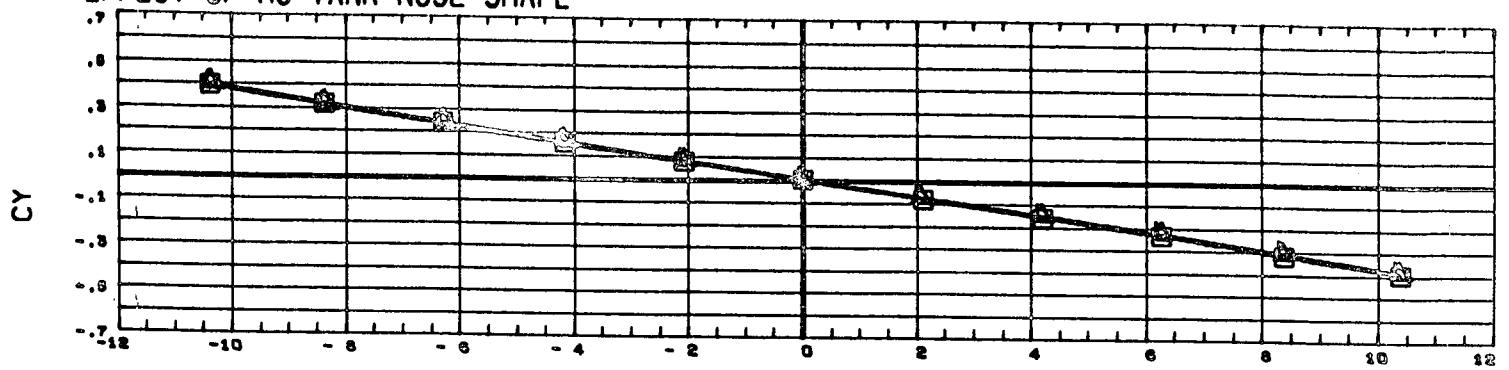
EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDFER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T602S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71128) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

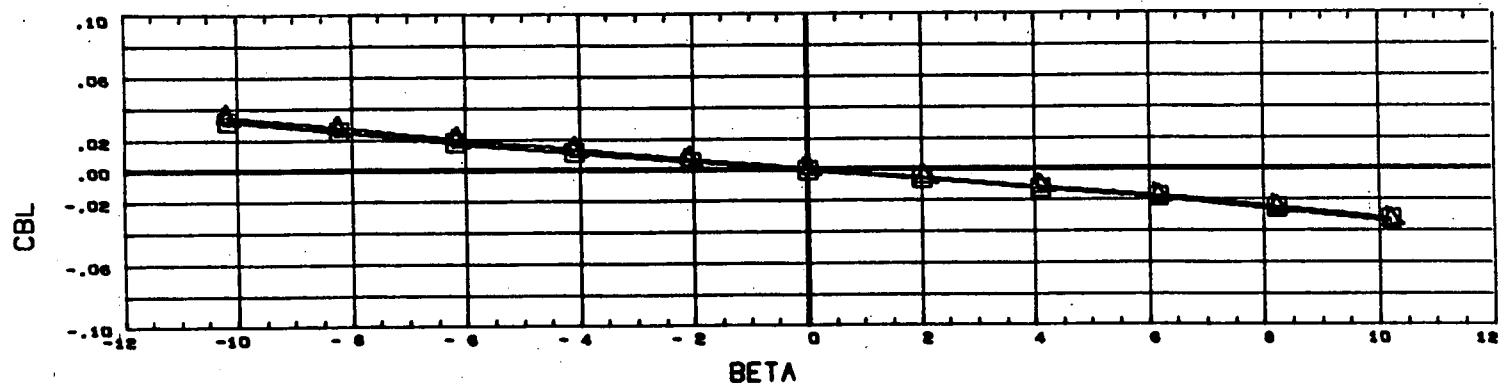
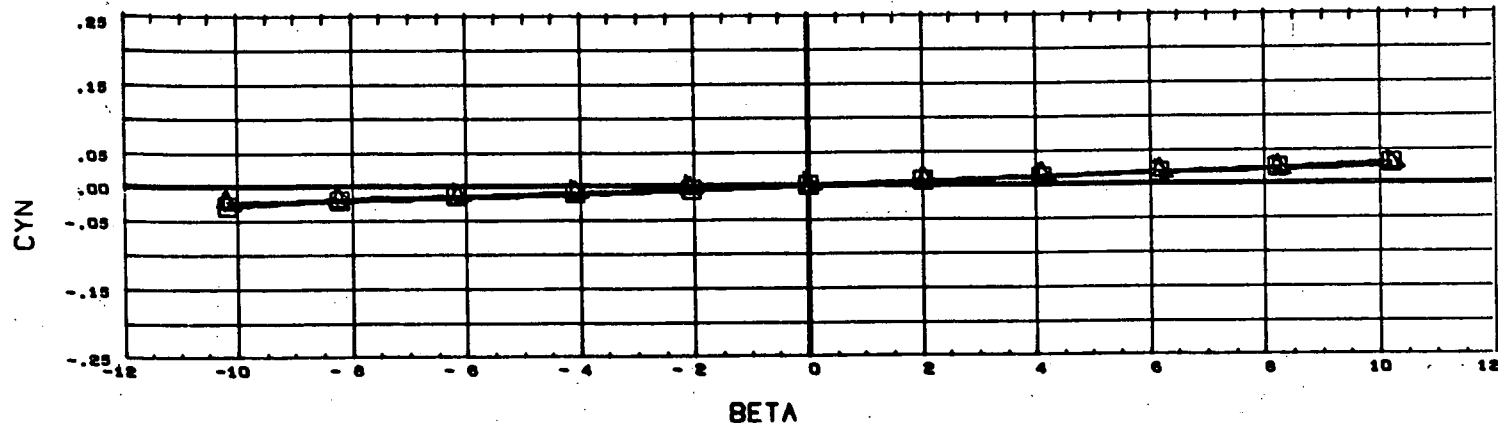
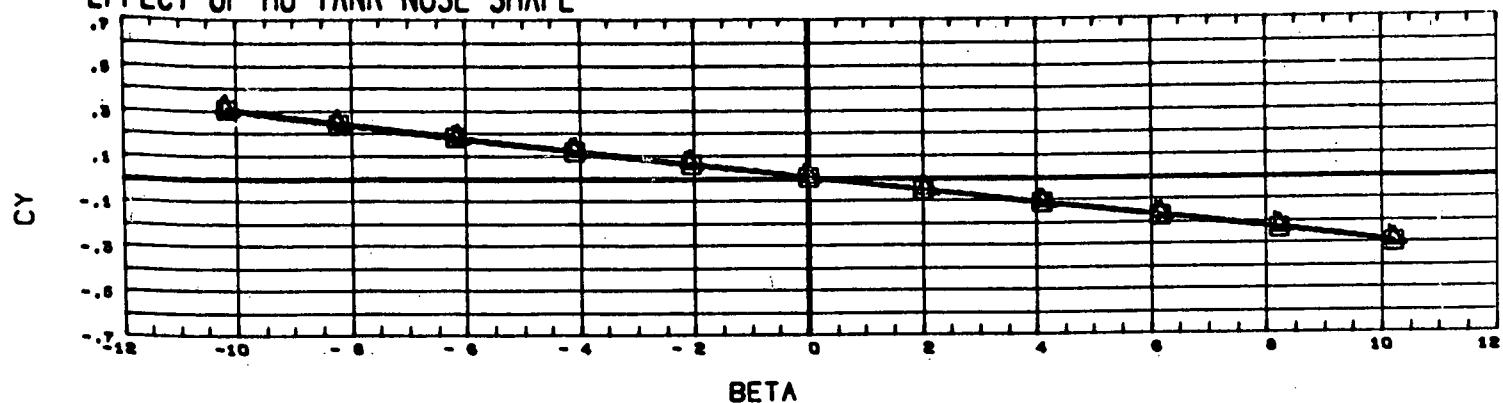
EFFECT OF HO TANK NOSE SHAPE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71128) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

EFFECT OF HO TANK NOSE SHAPE

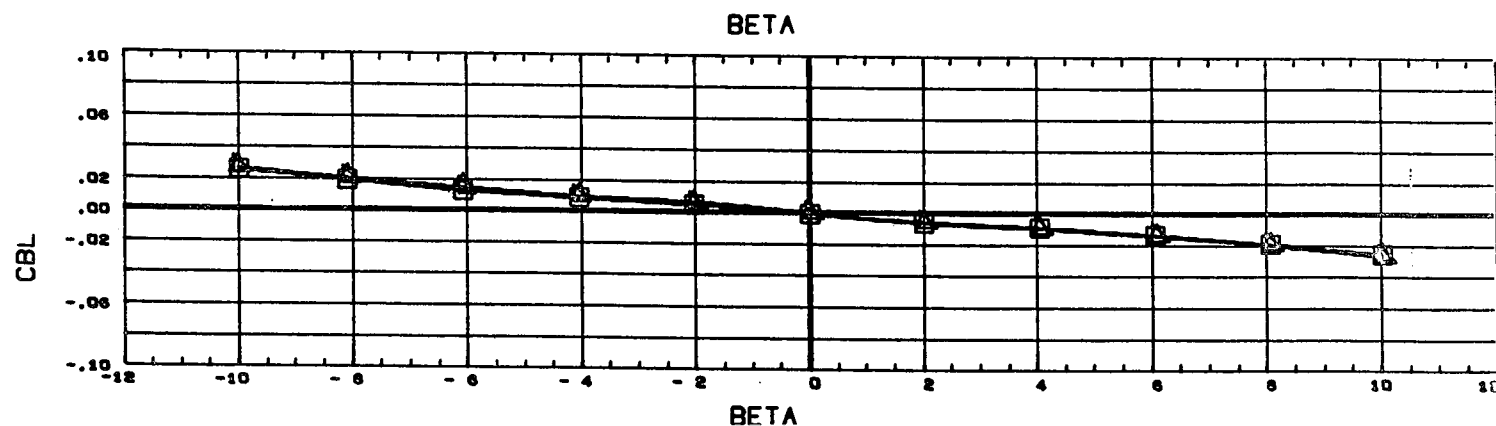
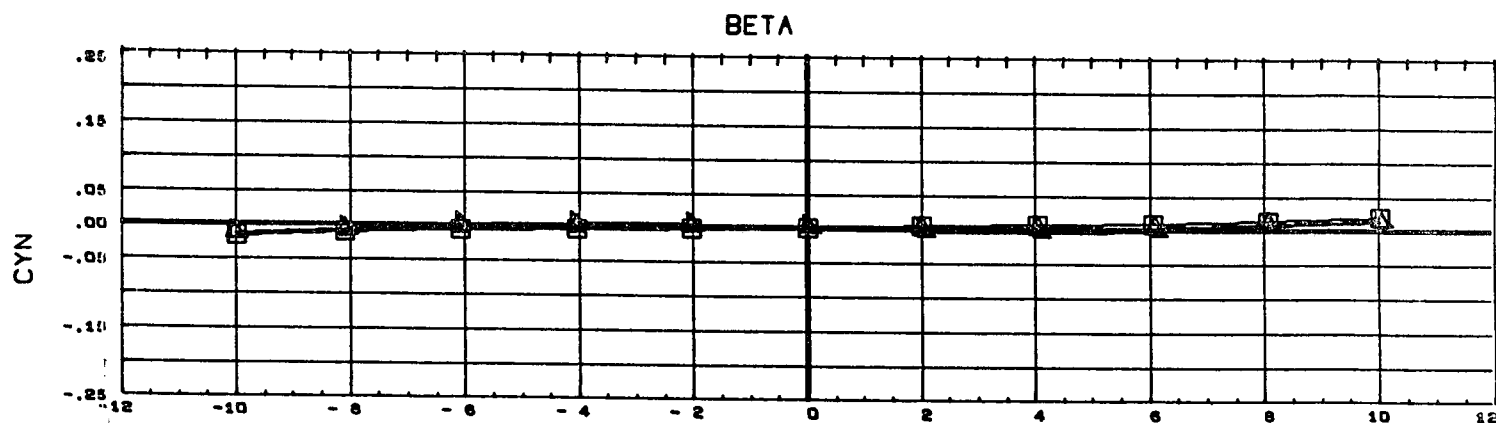
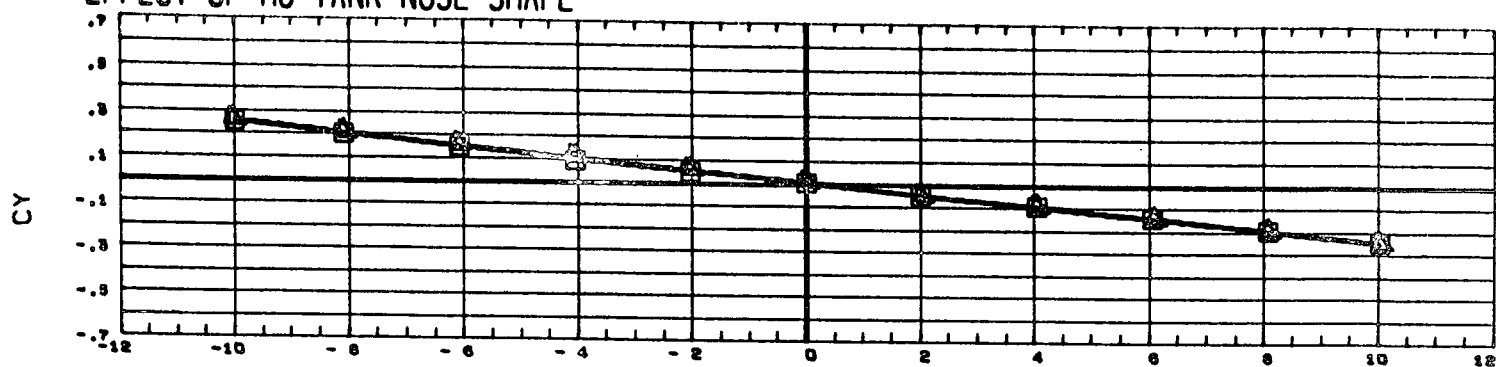


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71122) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T602S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71128) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2490 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF HO TANK NOSE SHAPE

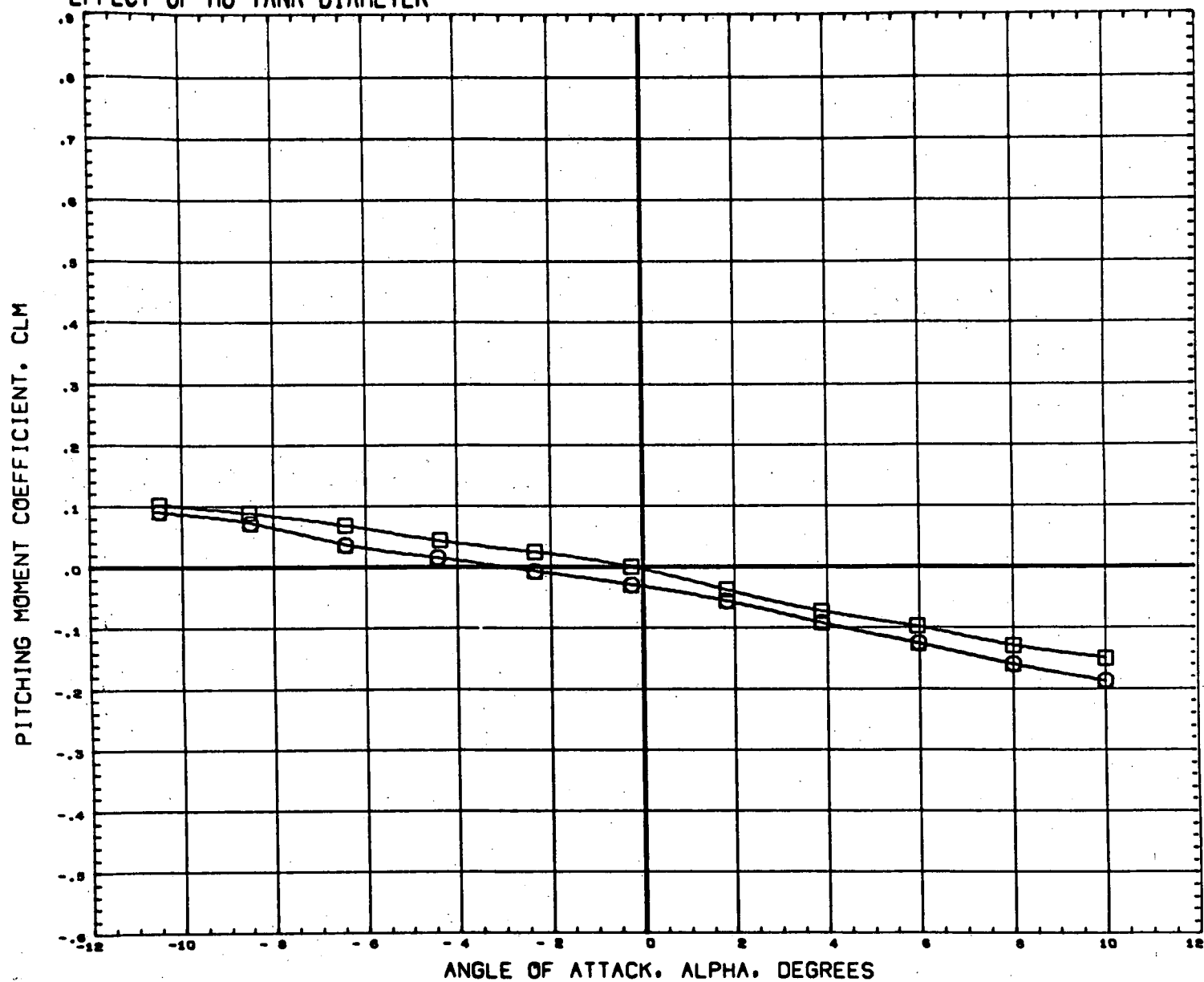


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|---------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ.IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4800 IN. |
| (A71124) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71126) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71128) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

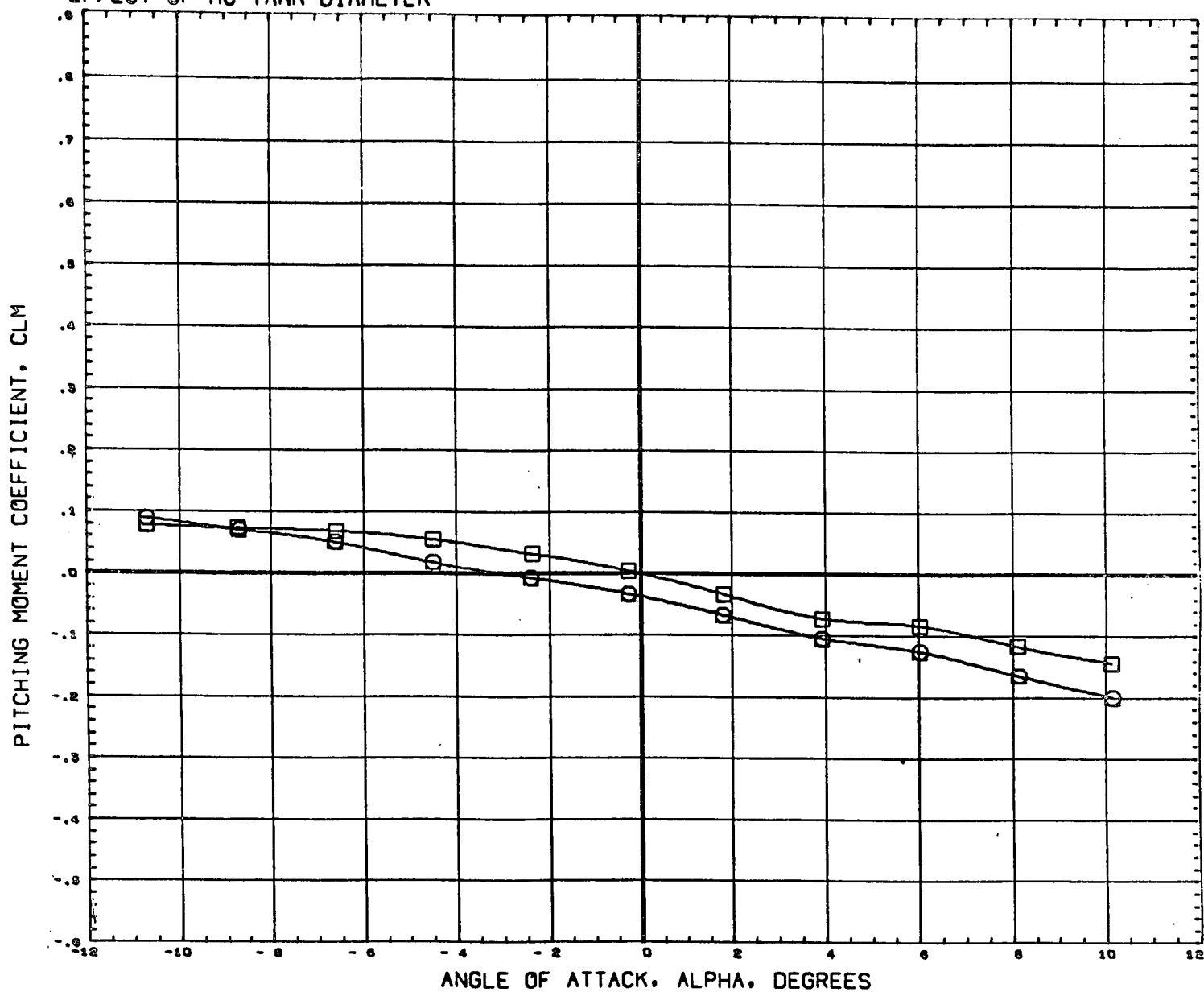
MACH

.60

PAGE

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EFFECT OF HO TANK DIAMETER

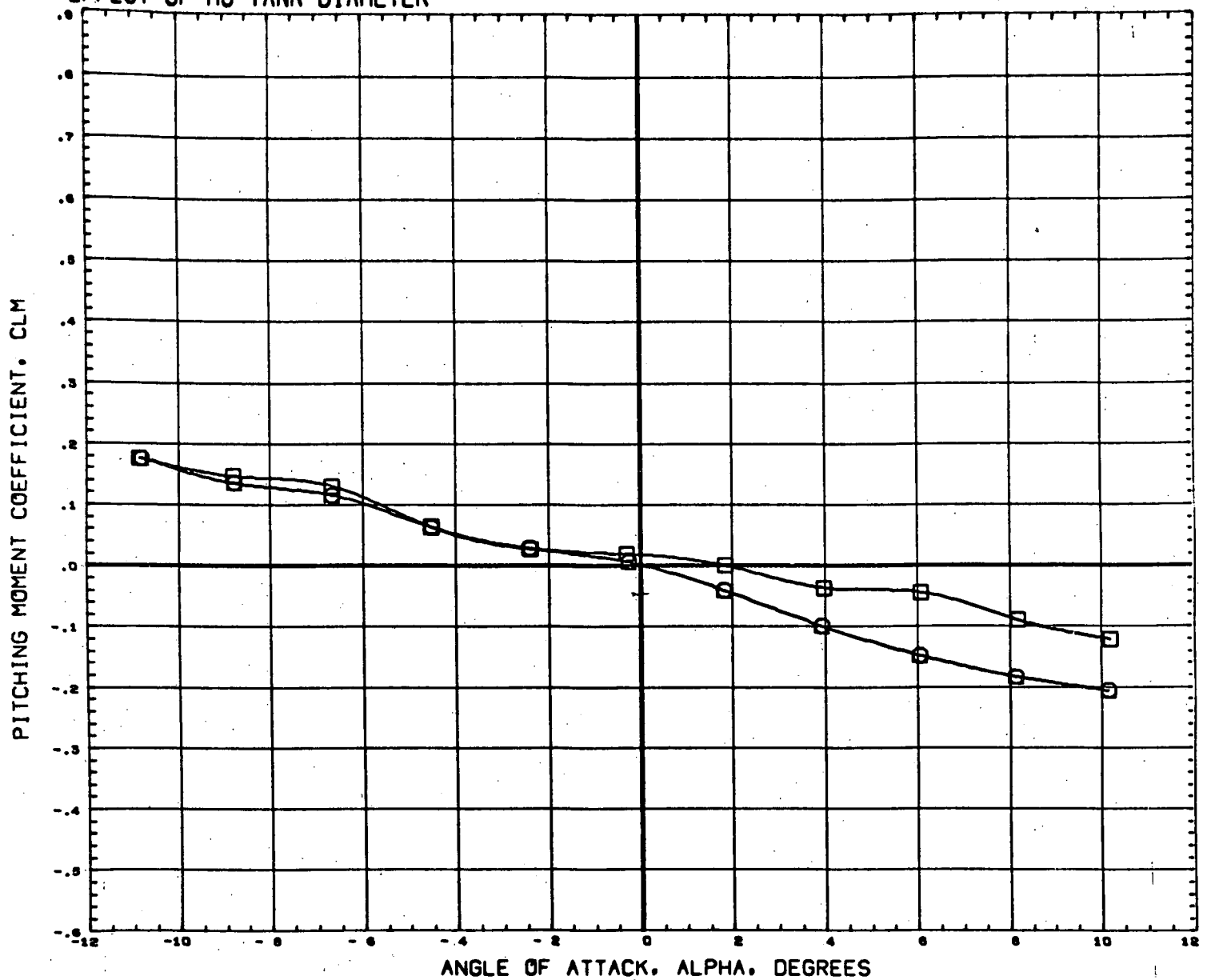


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.004G SCALE |

MACH .80

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EFFECT OF H₀ TANK DIAMETER



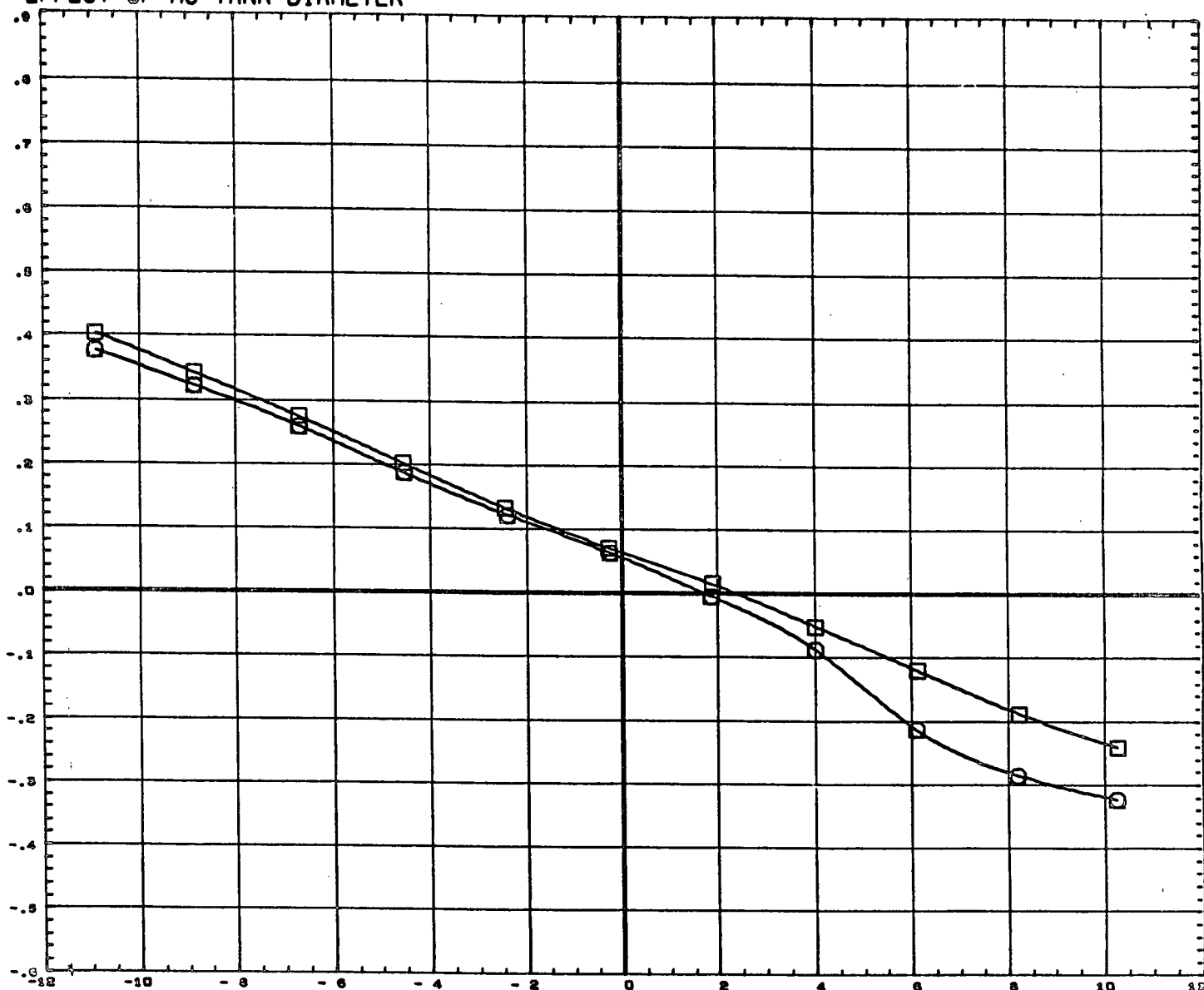
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y _S | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|----------------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF HO TANK DIAMETER

PITCHING MOMENT COEFFICIENT, CLM



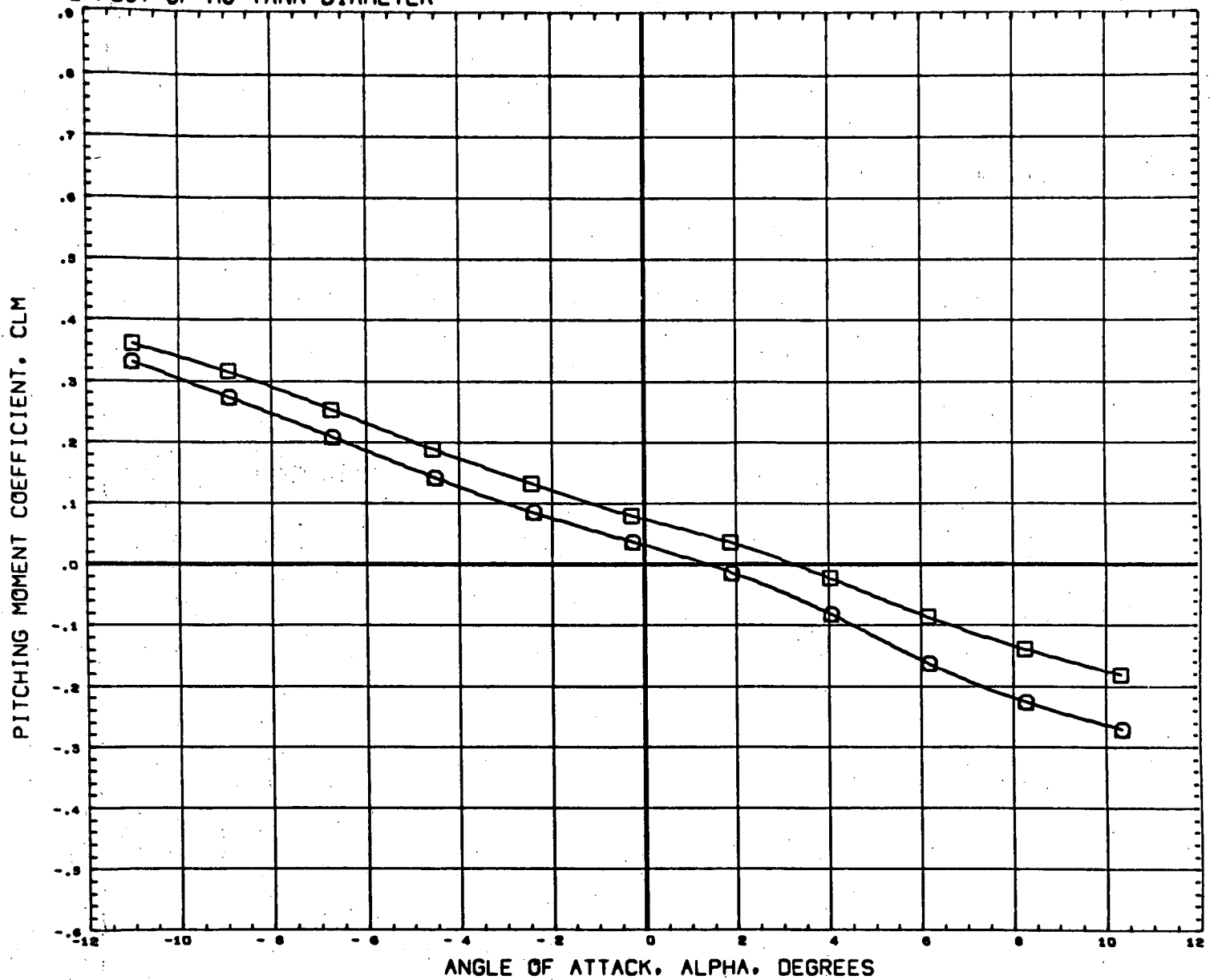
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF HO TANK DIAMETER



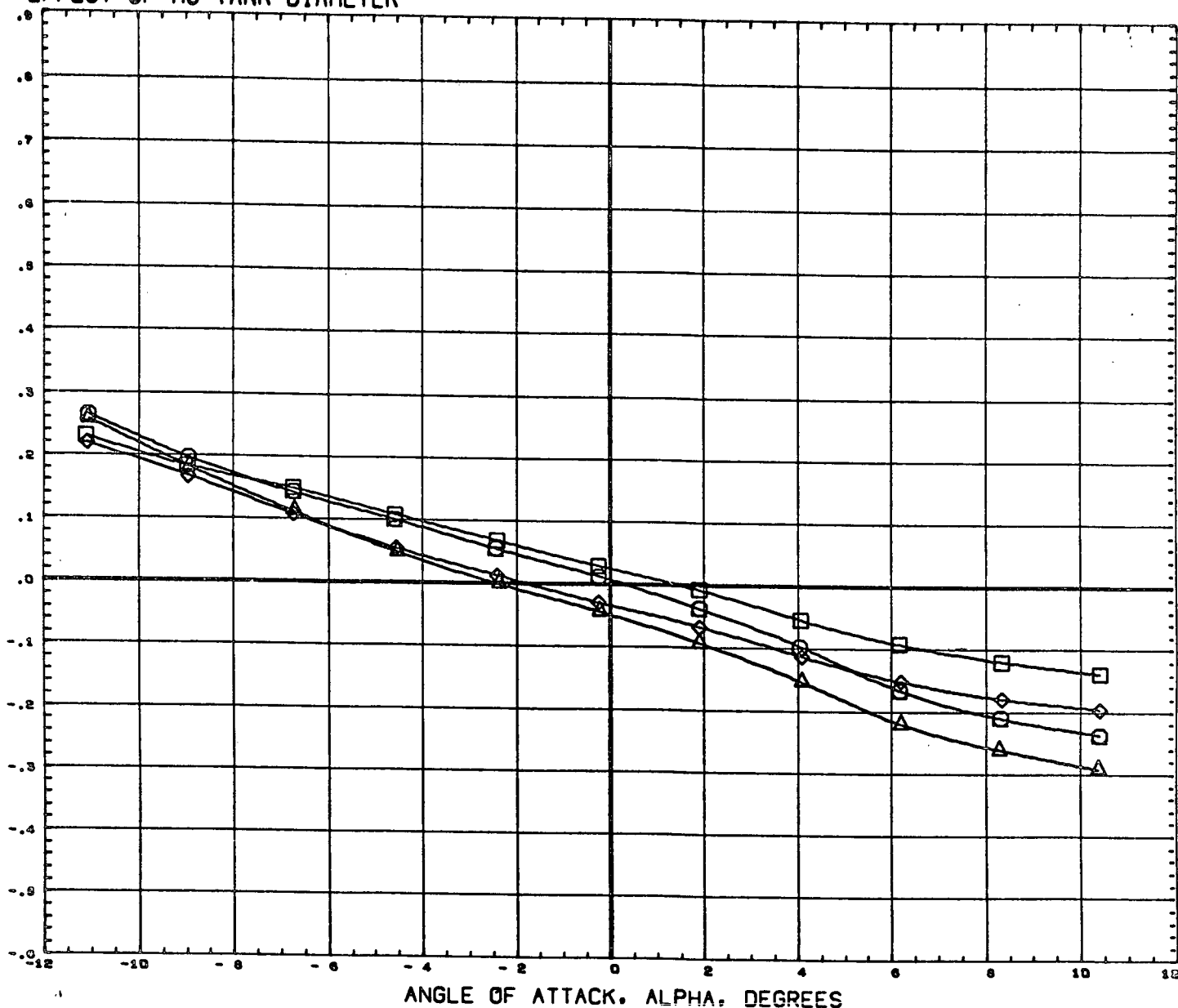
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.8480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.10

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EFFECT OF HO TANK DIAMETER

PITCHING MOMENT COEFFICIENT, CLM

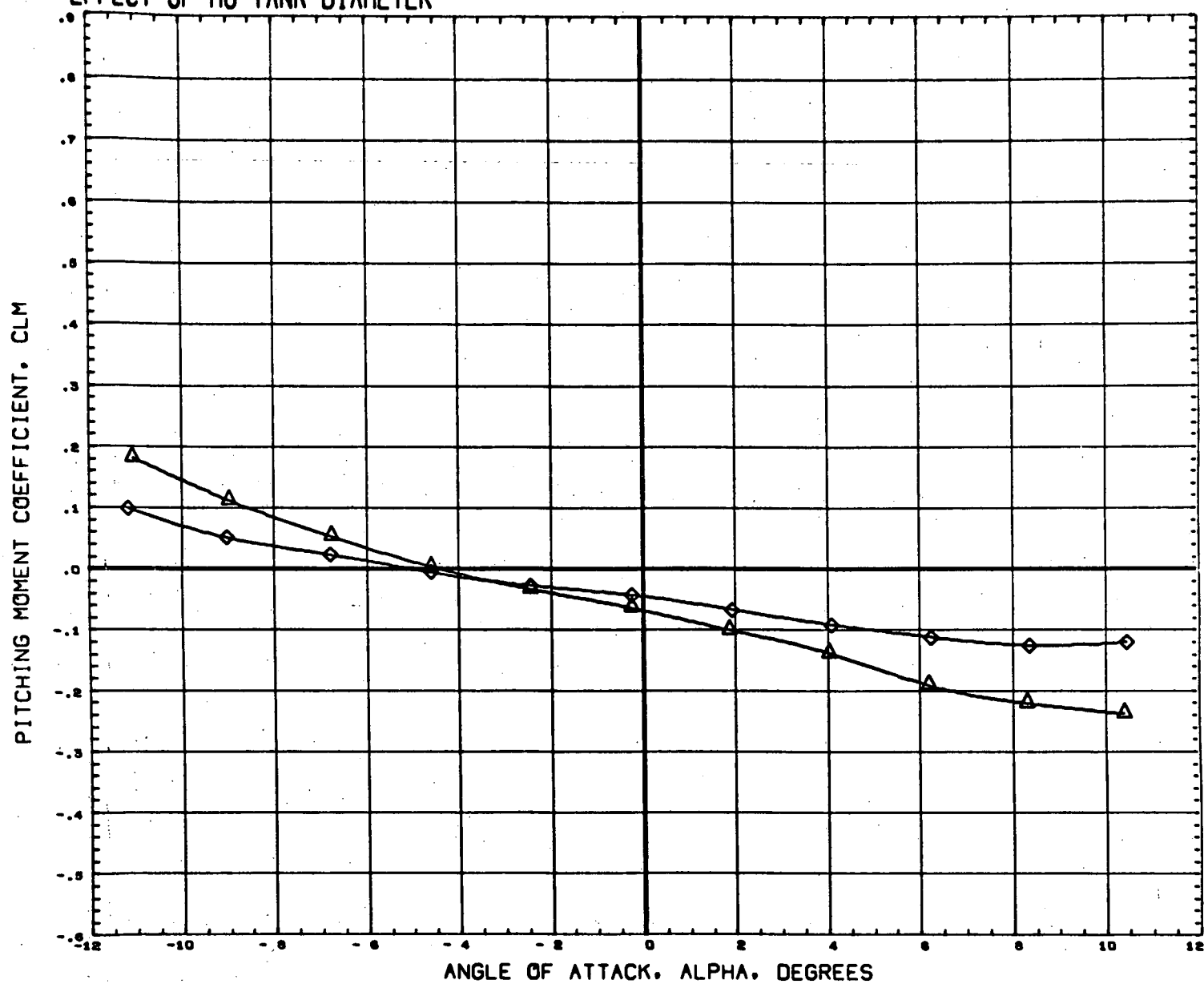


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF HO TANK DIAMETER



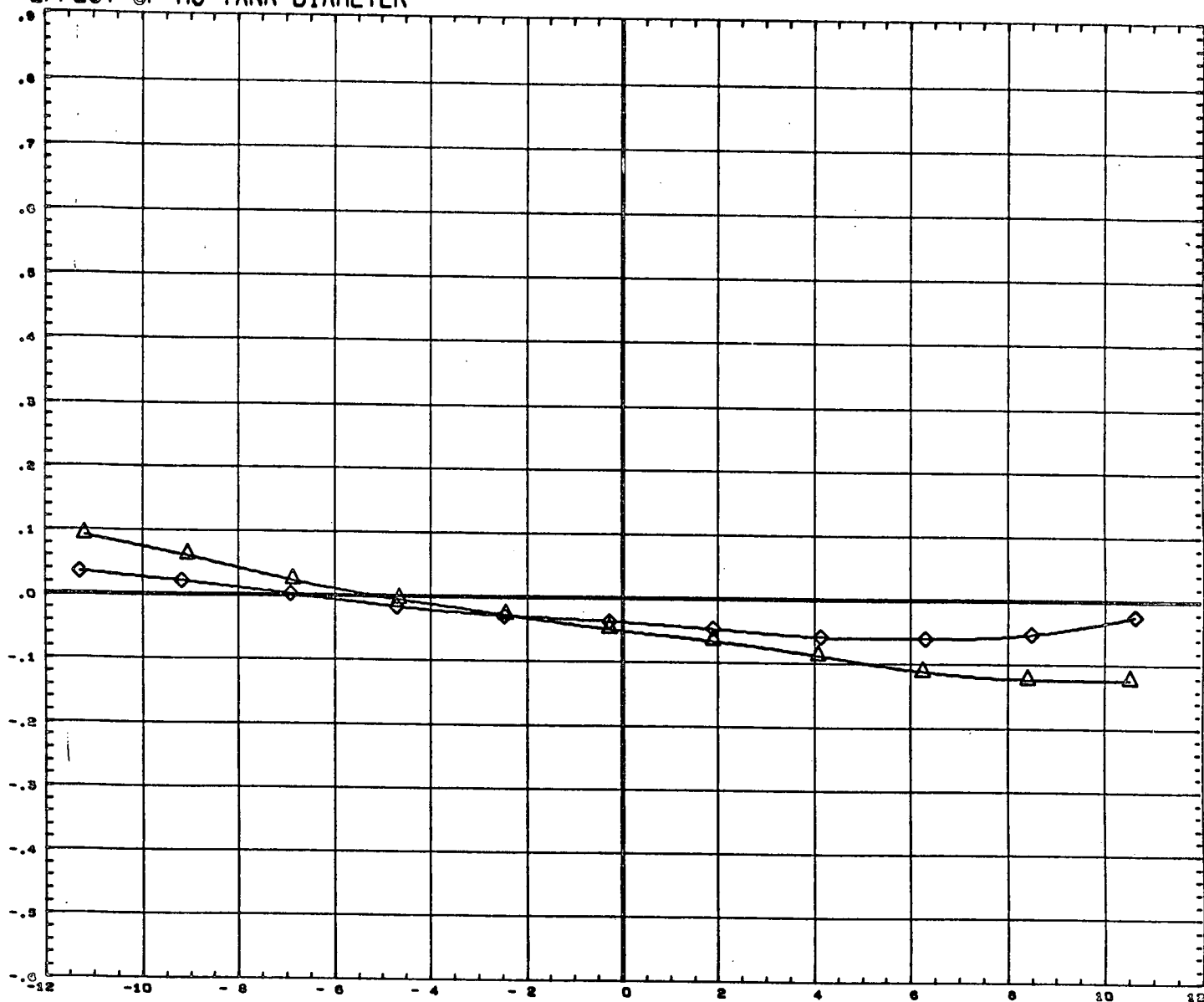
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

PAGE 77

EFFECT OF HO TANK DIAMETER

PITCHING MOMENT COEFFICIENT, CLM



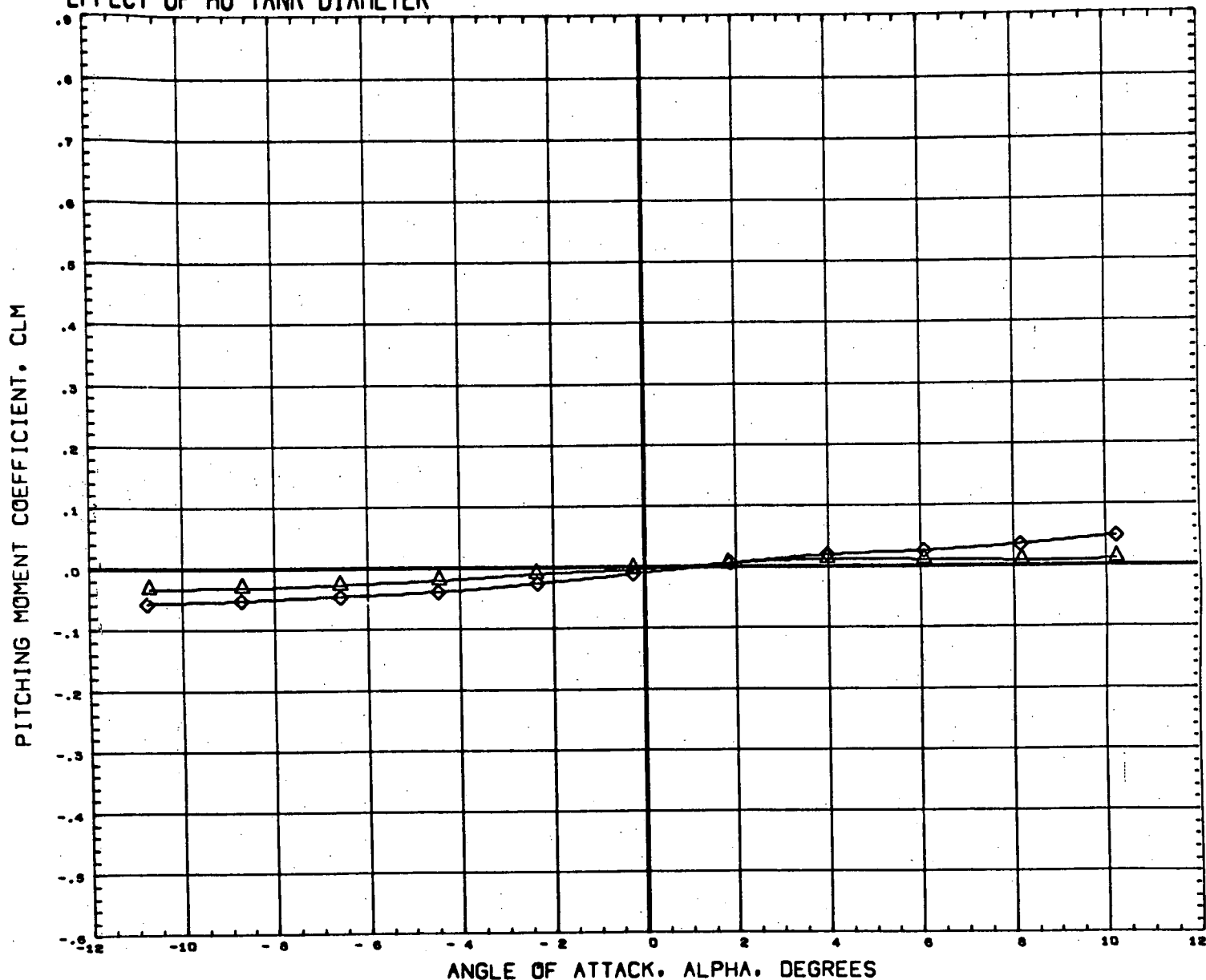
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 30. IN. |
| (871091) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

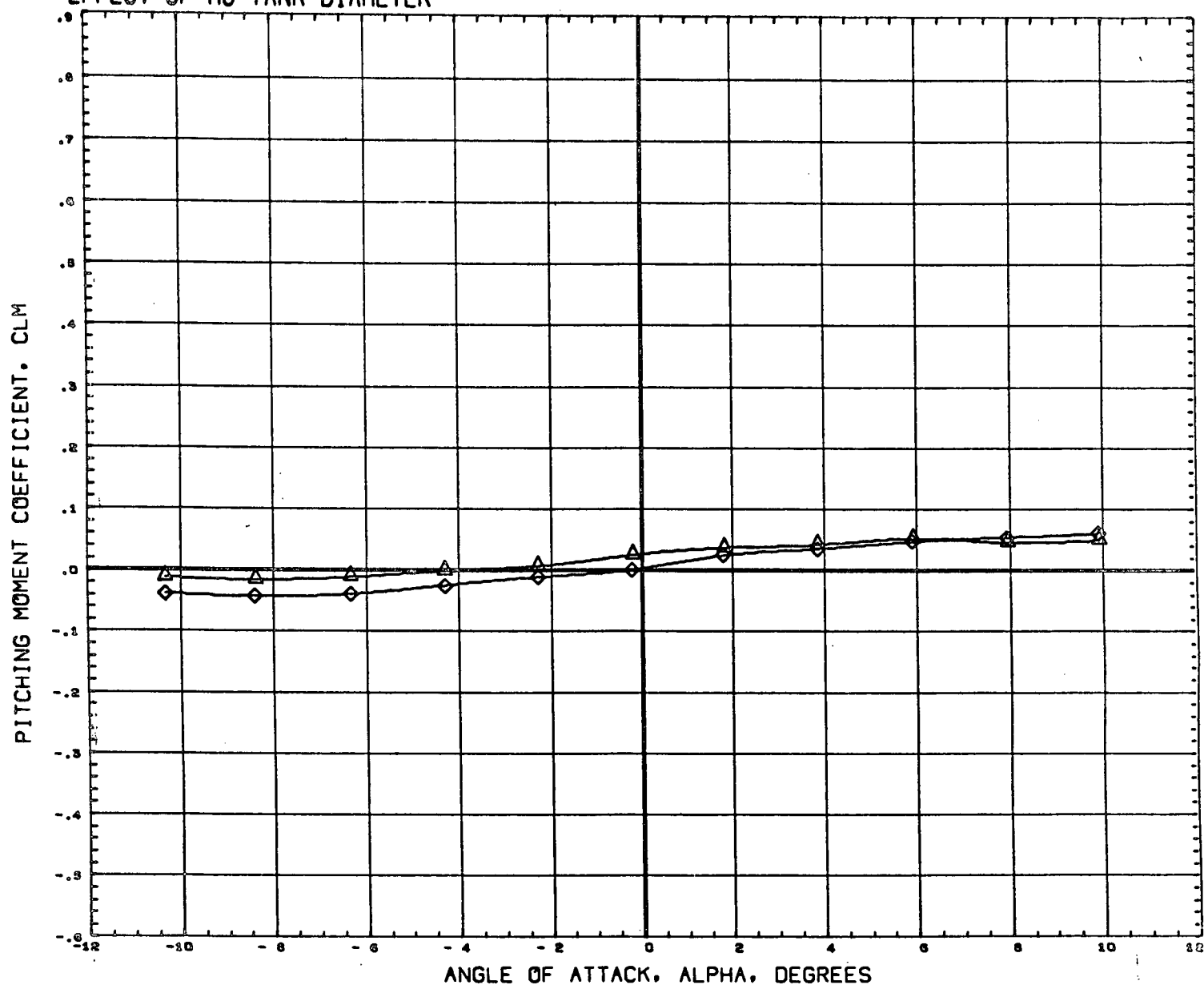
MACH

3.48

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EFFECT OF NO TANK DIAMETER

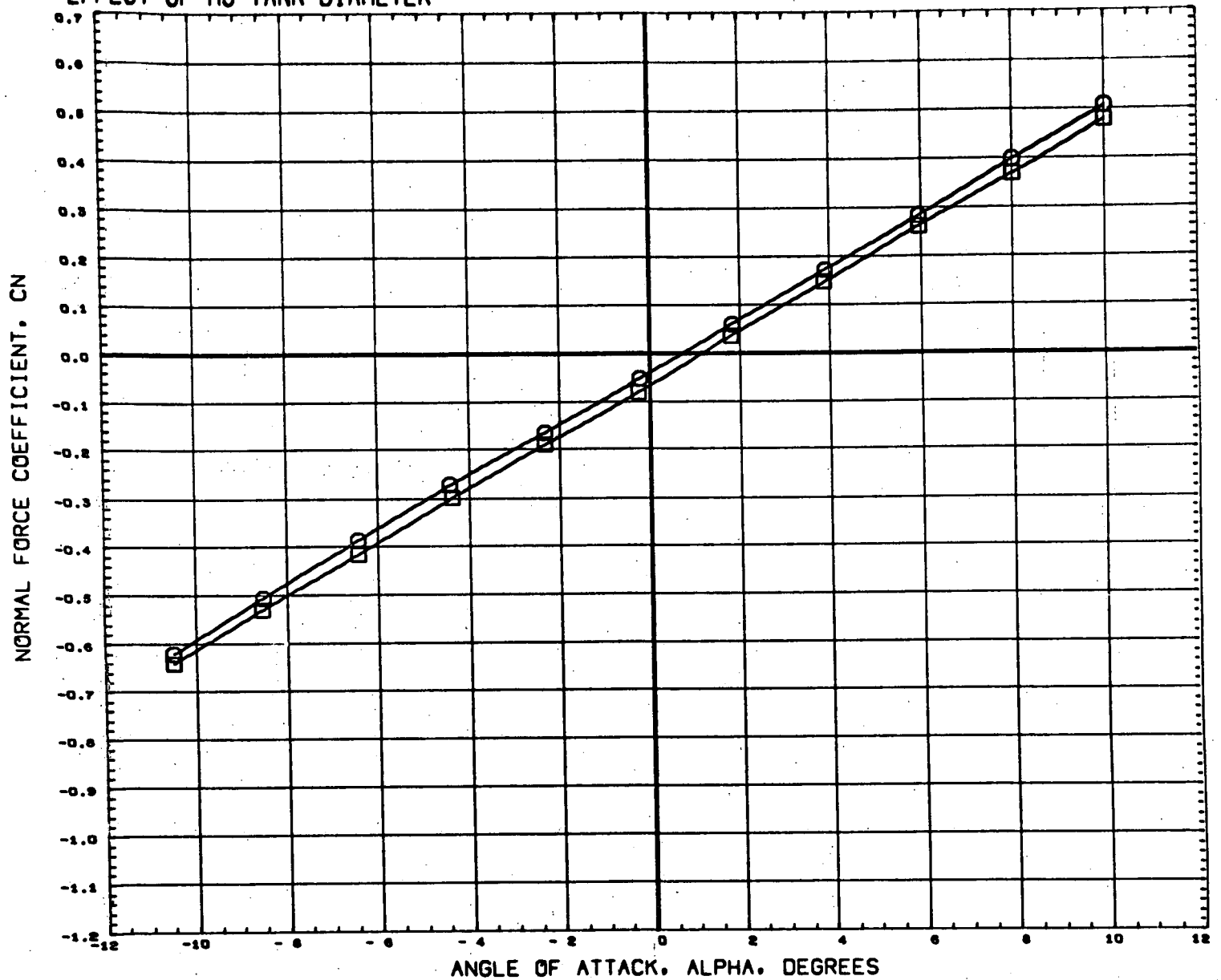


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (871069) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 | SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 4.96

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EFFECT OF HO TANK DIAMETER

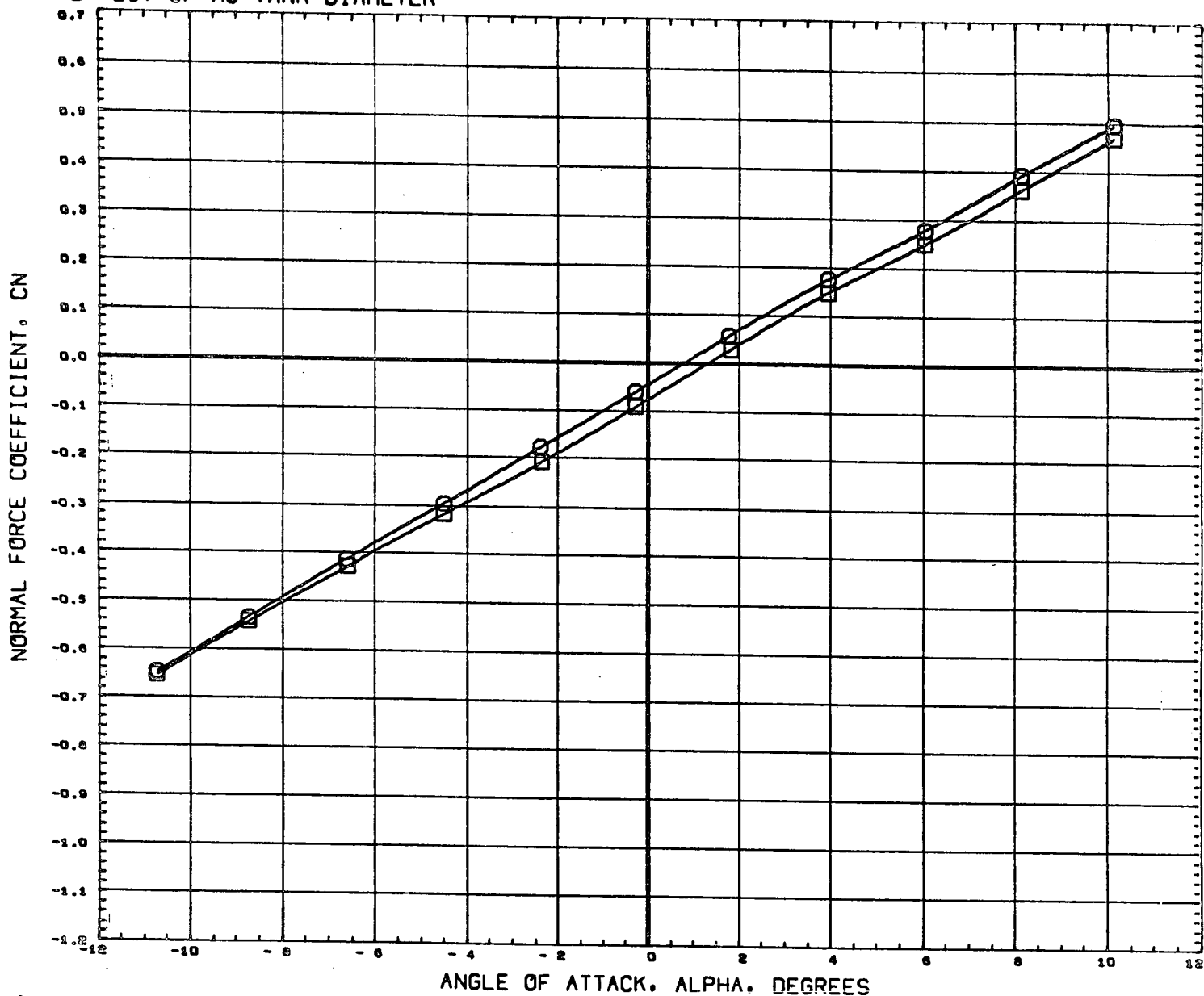


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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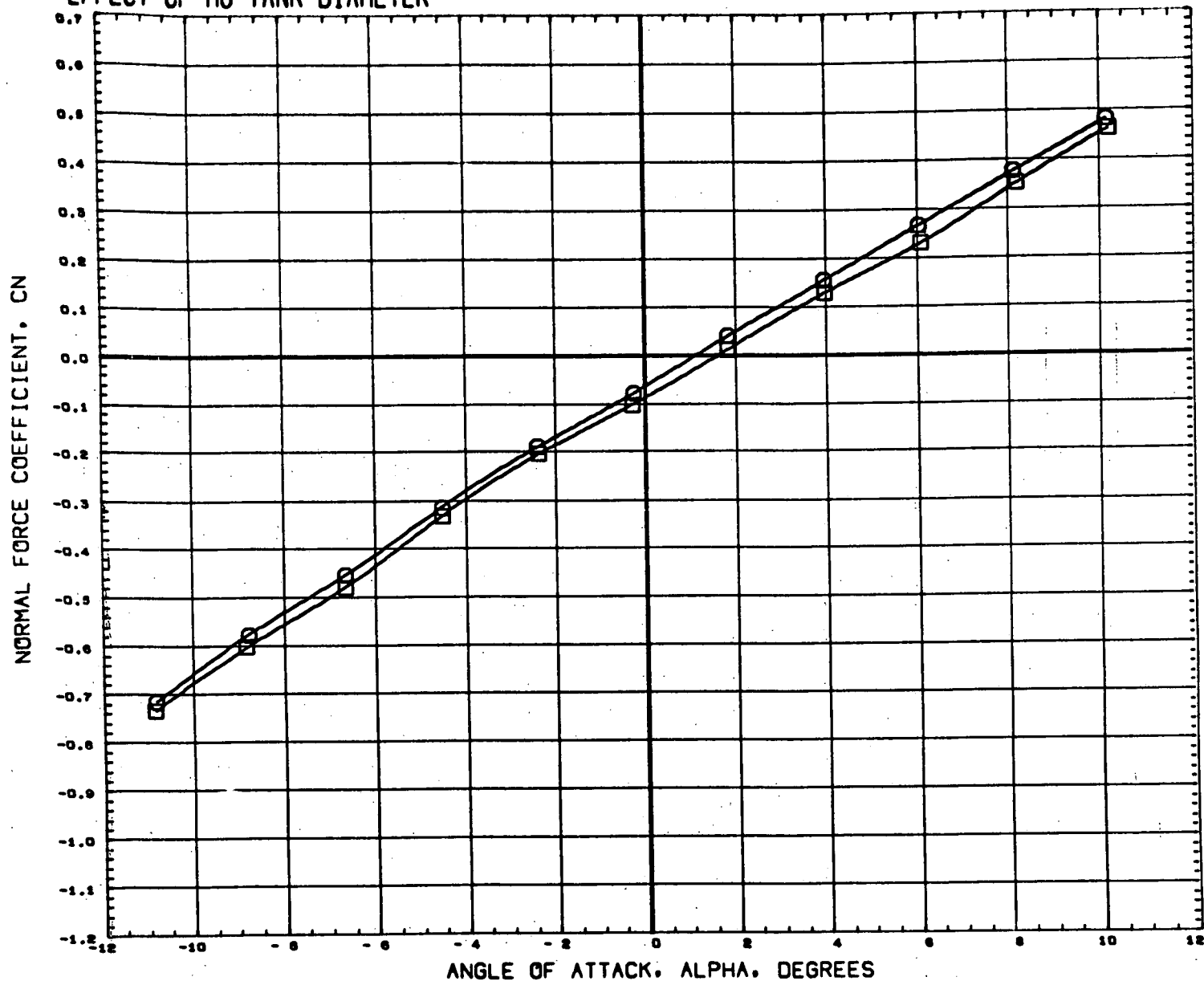
EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 944X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 944X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

EFFECT OF H0 TANK DIAMETER

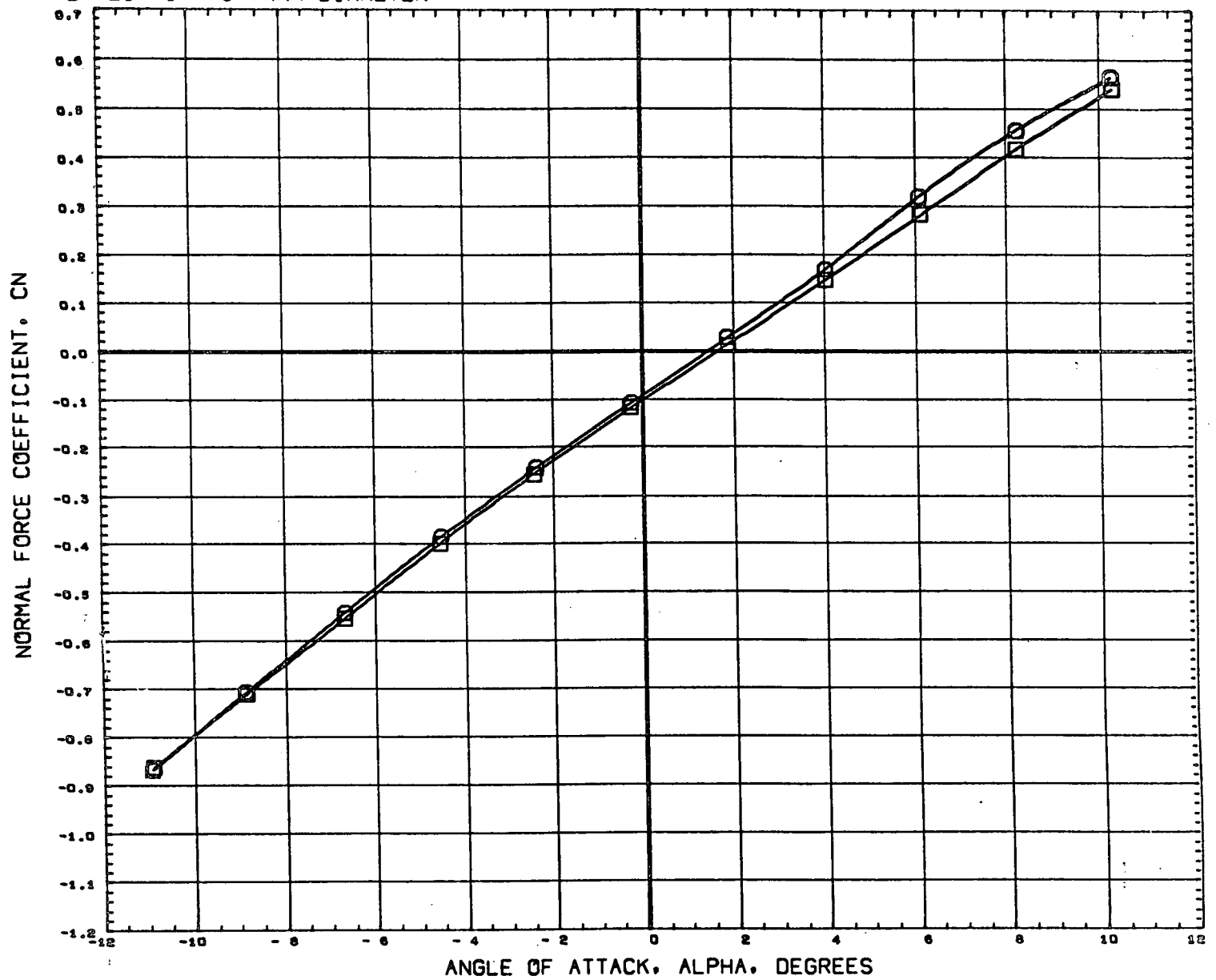


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF NO TANK DIAMETER

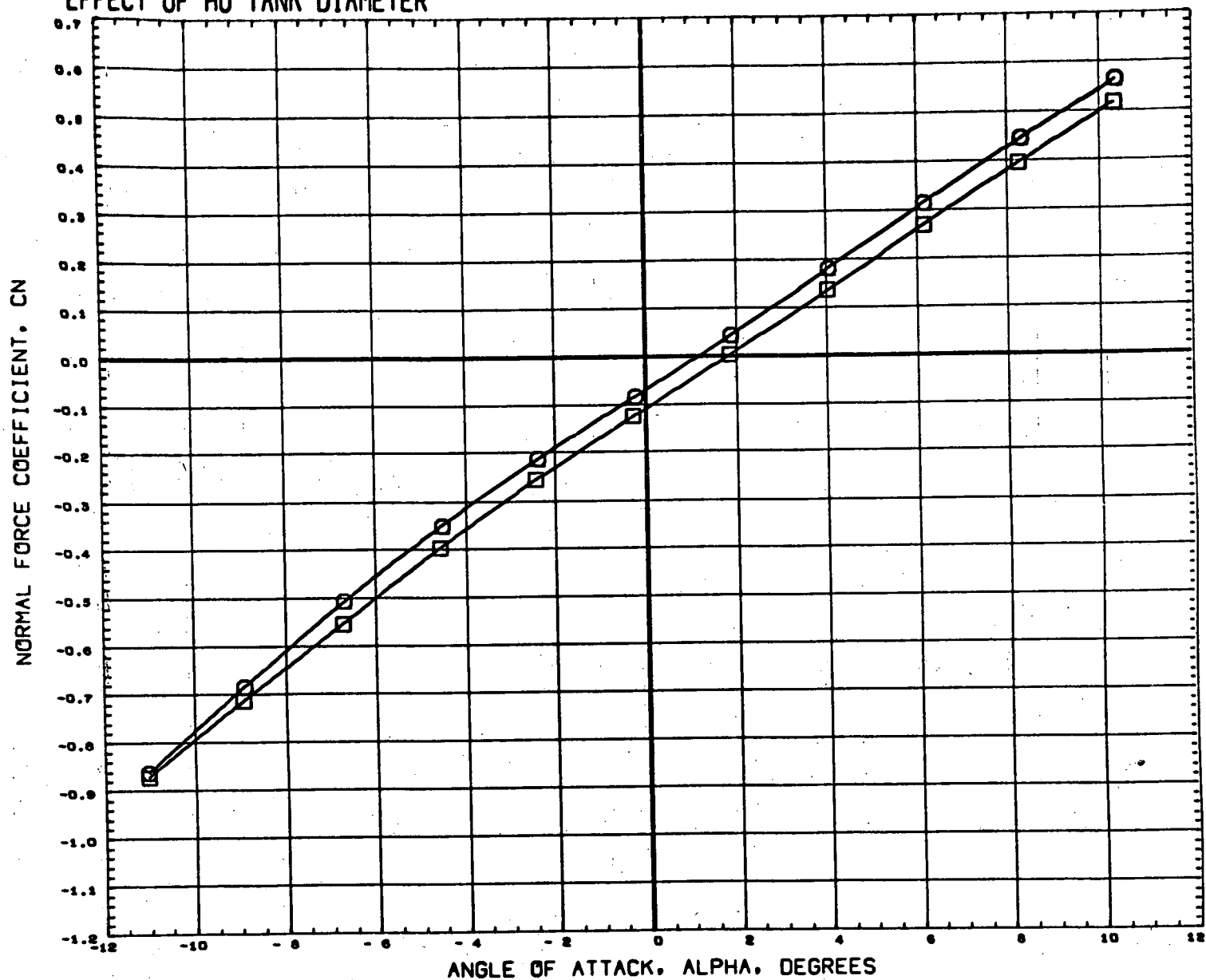


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF HQ TANK DIAMETER

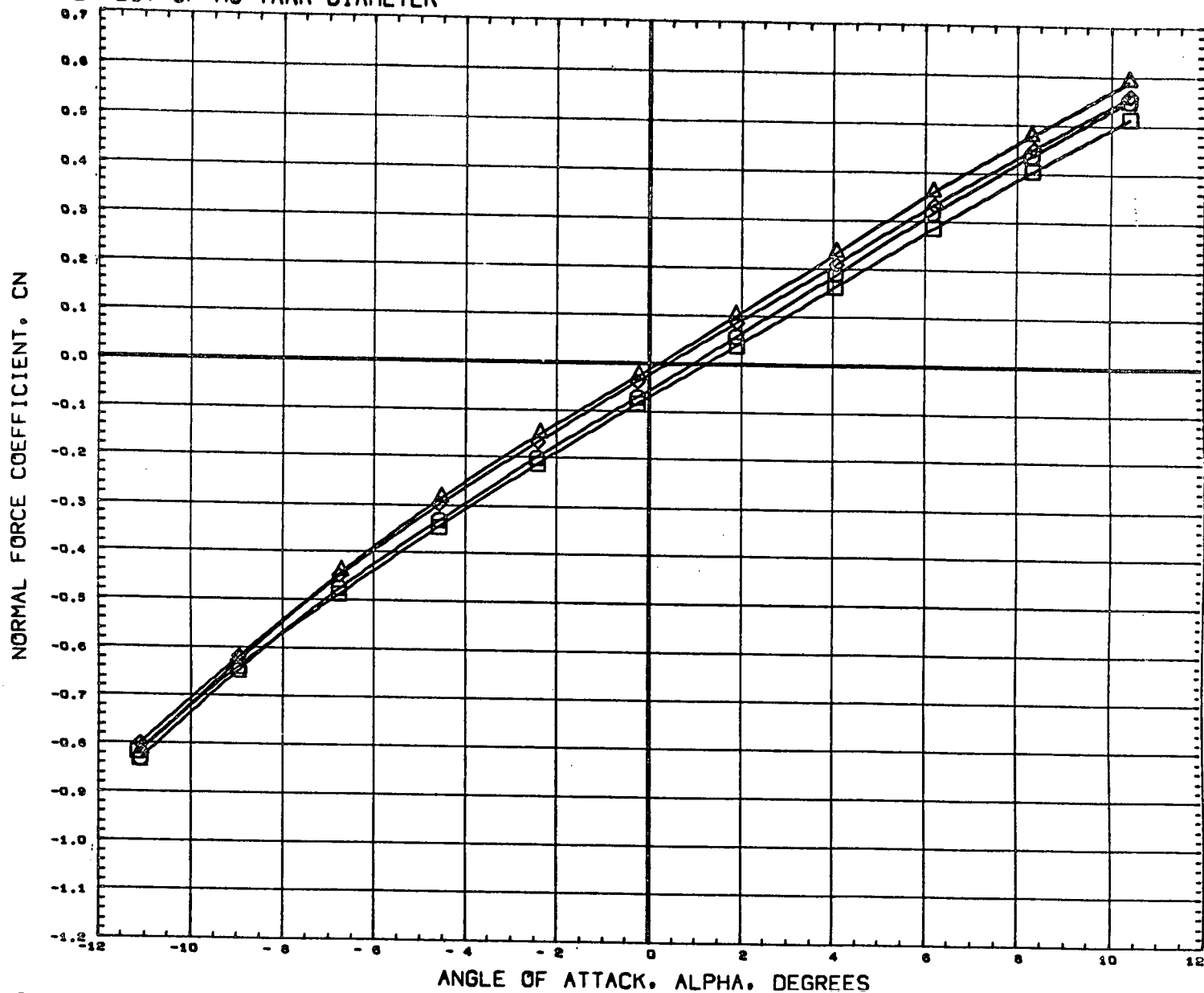


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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EFFECT OF HO TANK DIAMETER



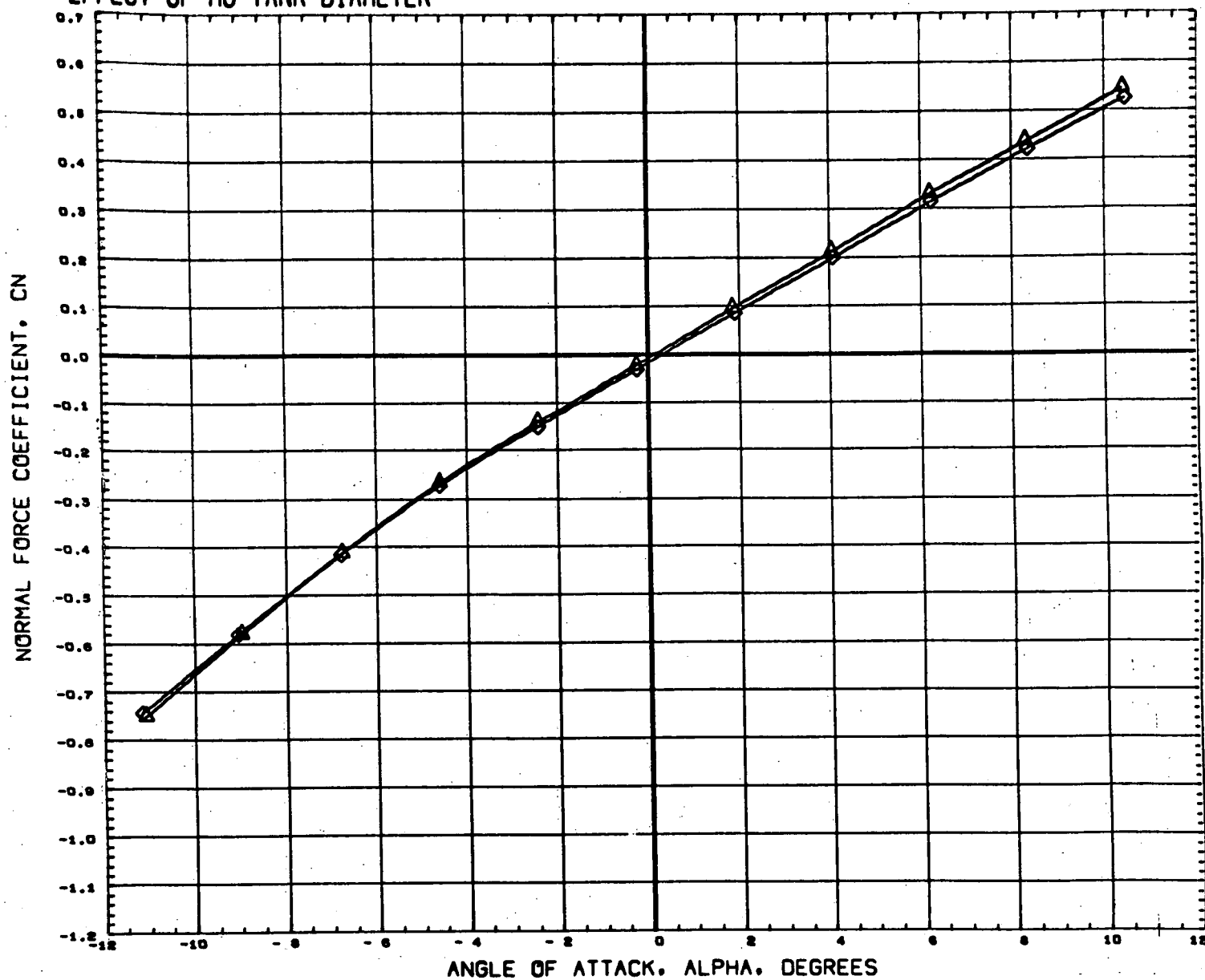
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

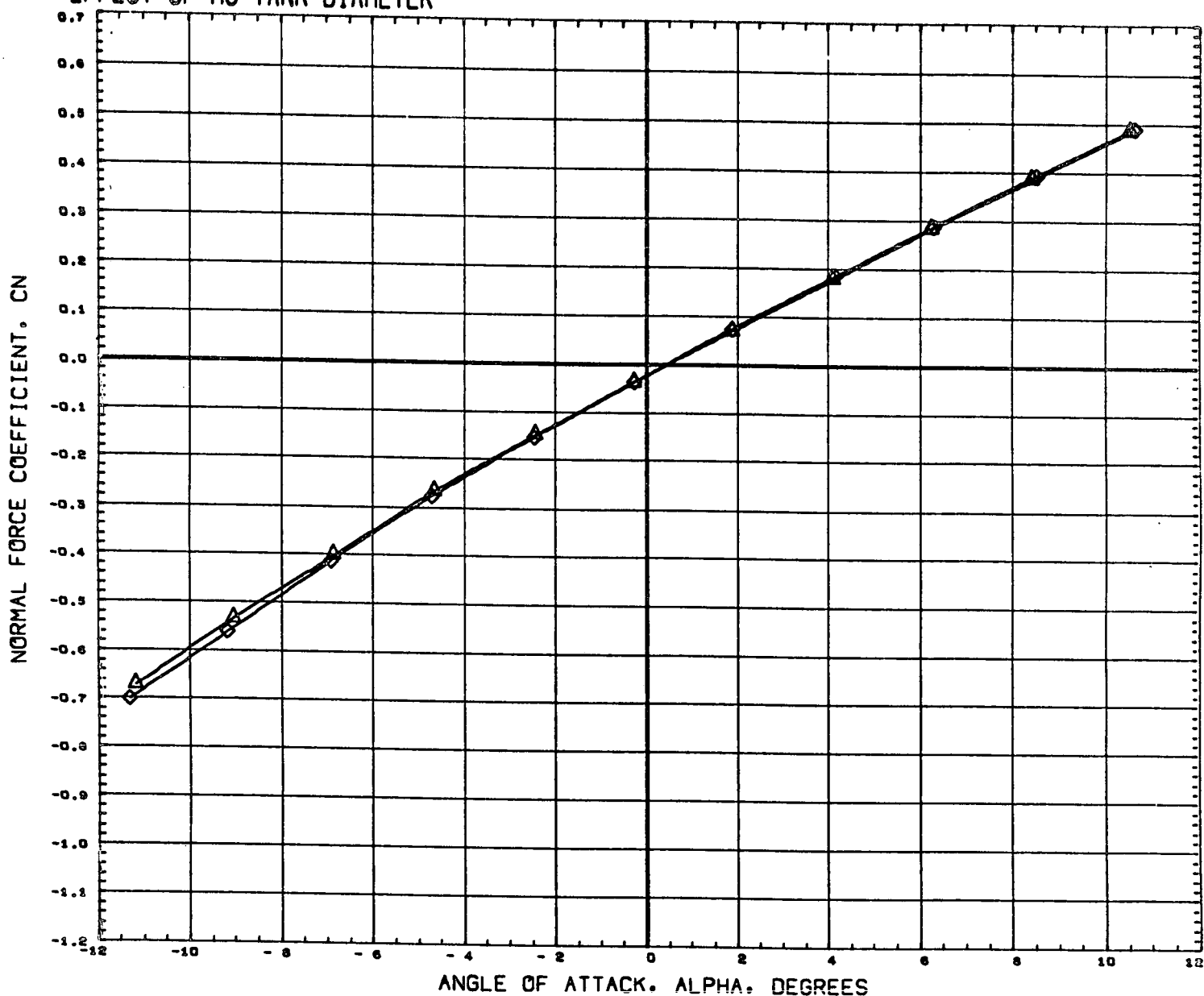
MACH

1.46

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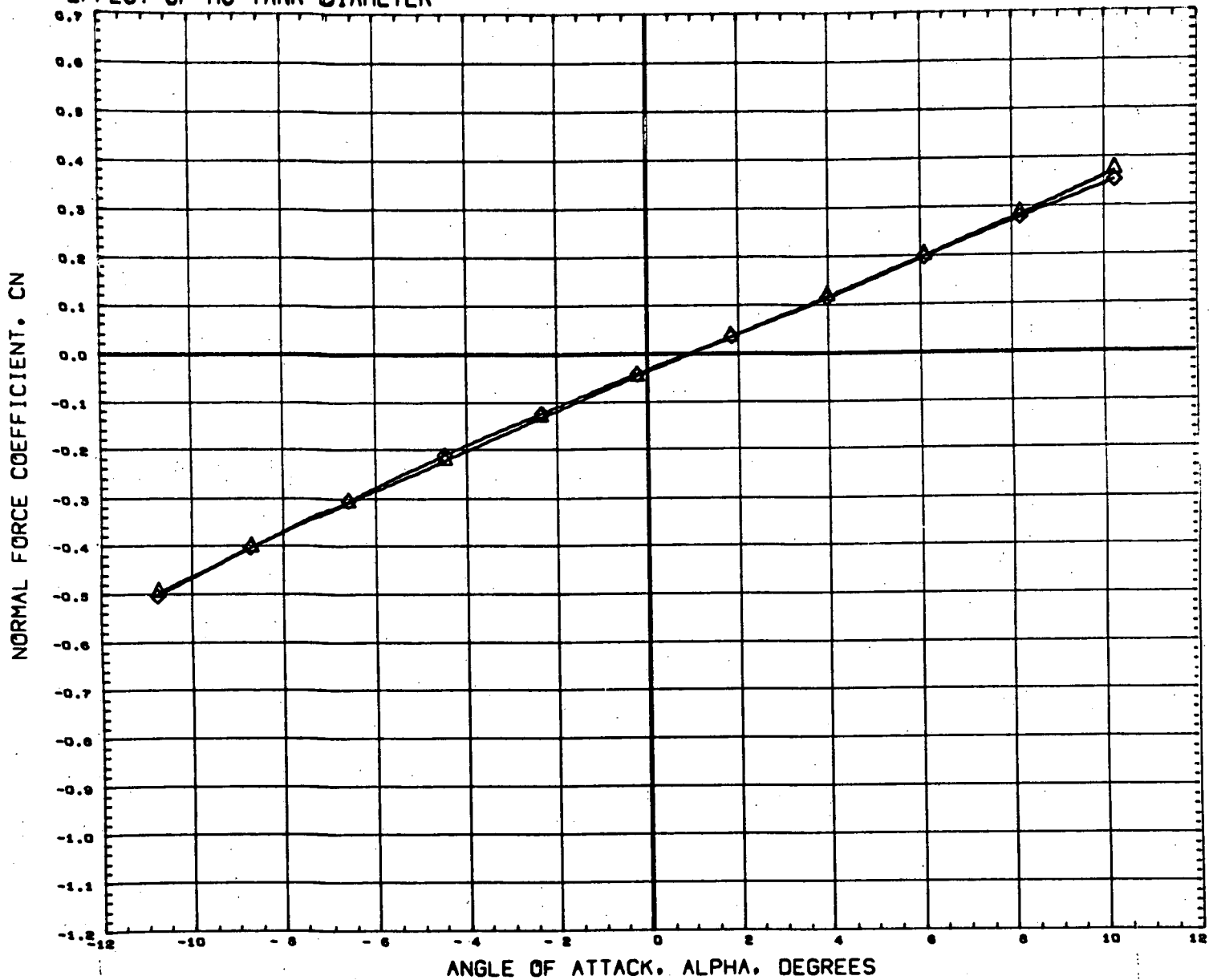
EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

EFFECT OF HO TANK DIAMETER

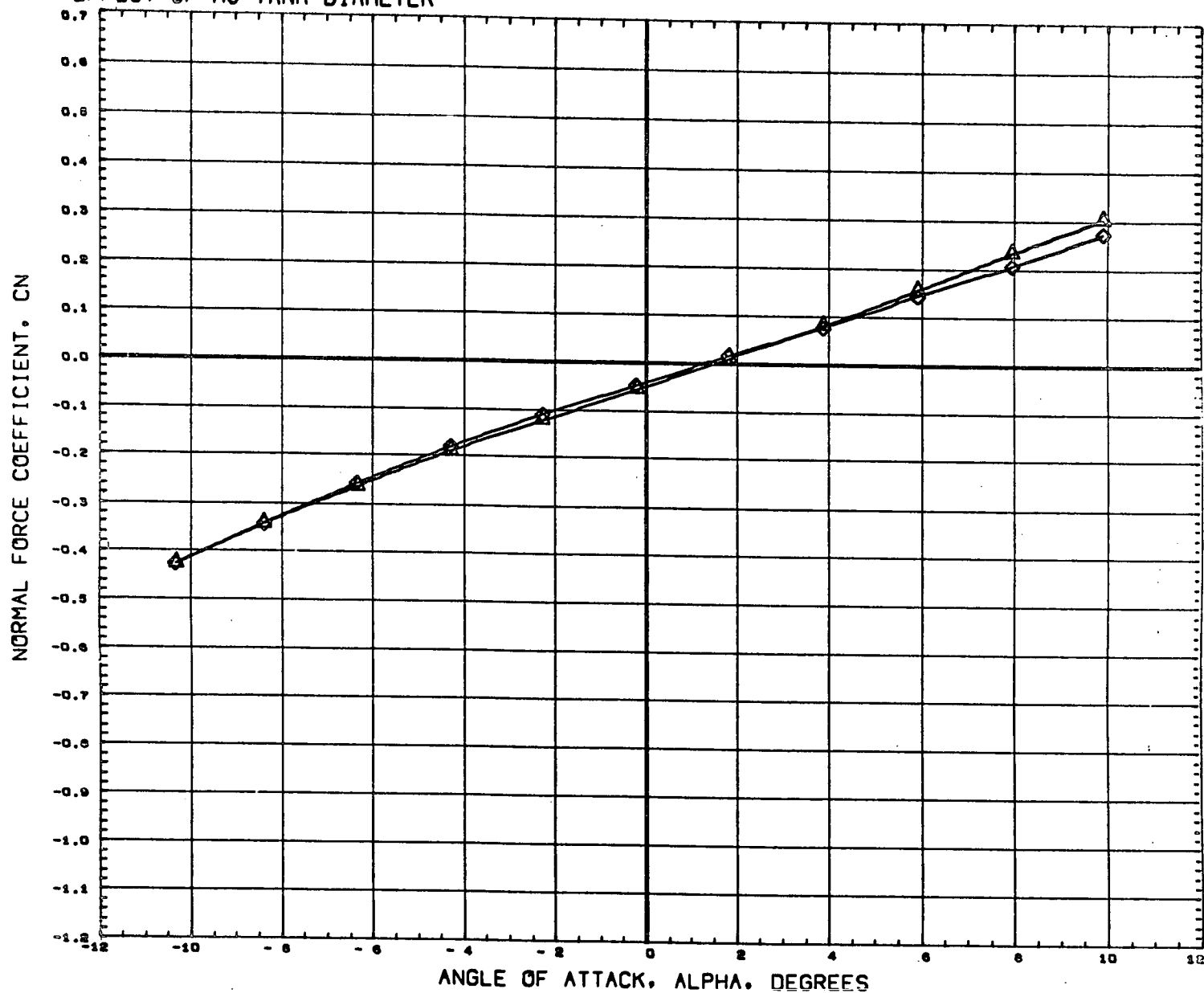


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6600 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREP | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF H₀ TANK DIAMETER

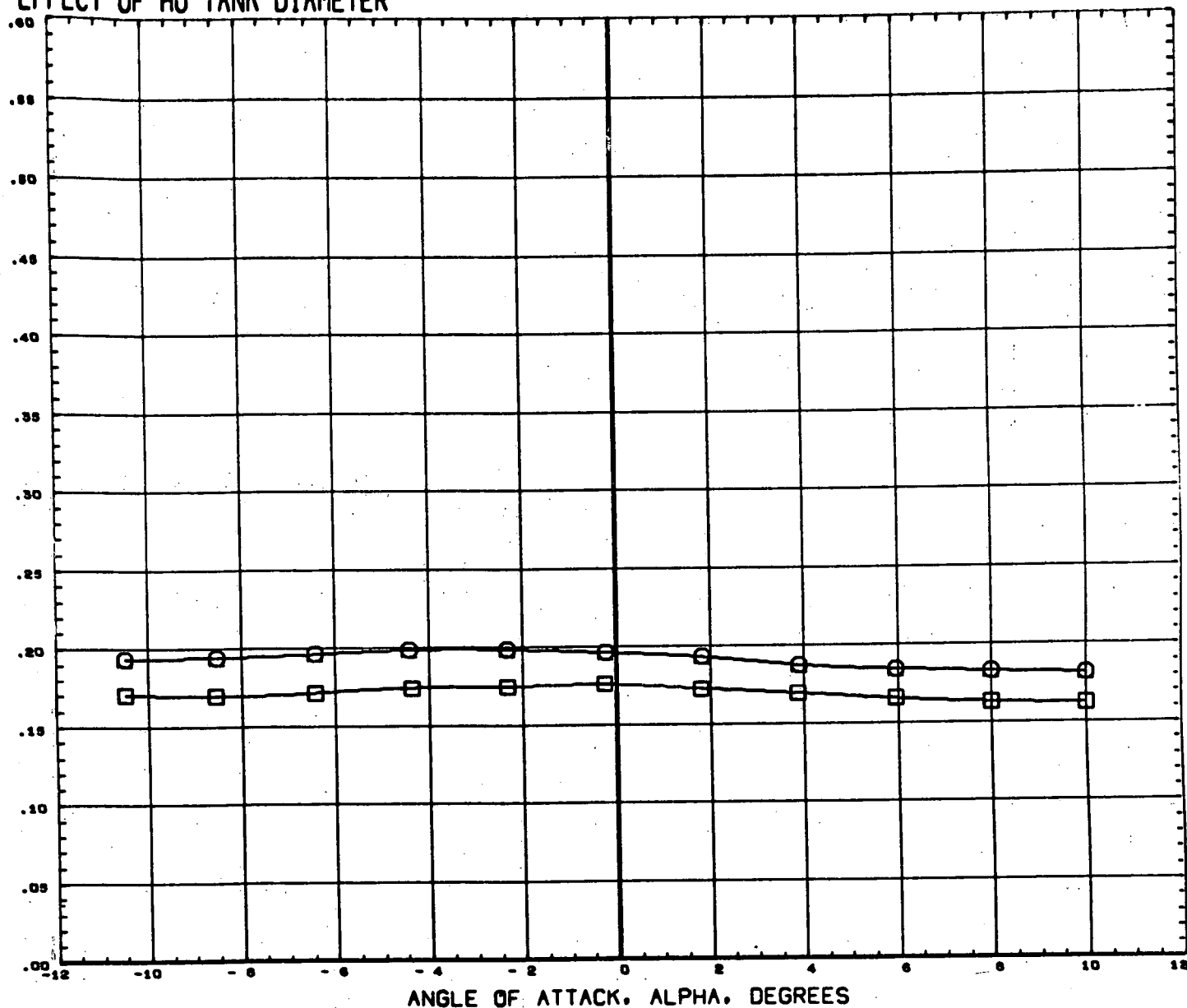


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

EFFECT OF HO TANK DIAMETER

AXIAL FORCE COEFFICIENT, CA



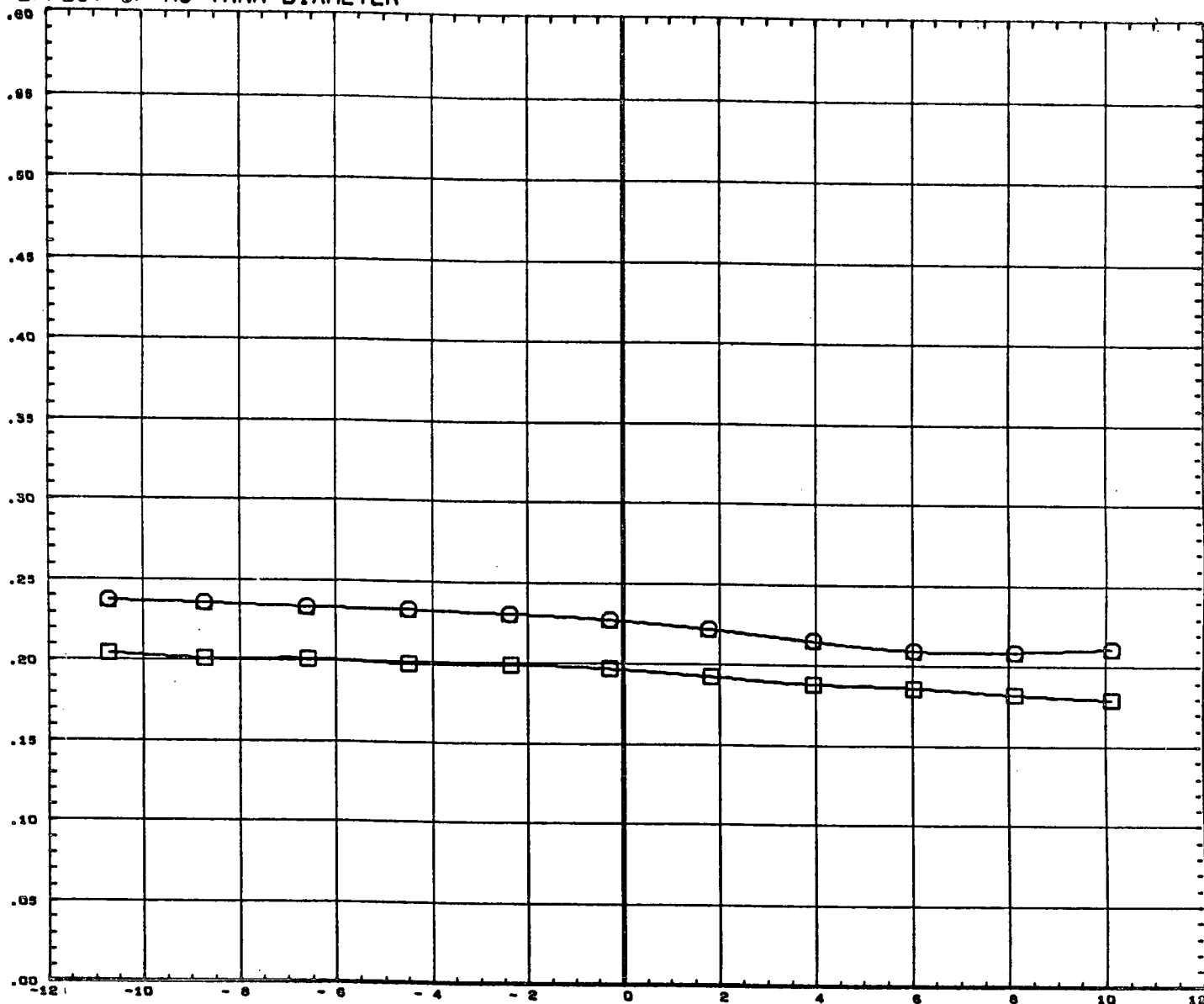
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF H0 TANK DIAMETER

AXIAL FORCE COEFFICIENT, CA



ANGLE OF ATTACK, ALPHA, DEGREES

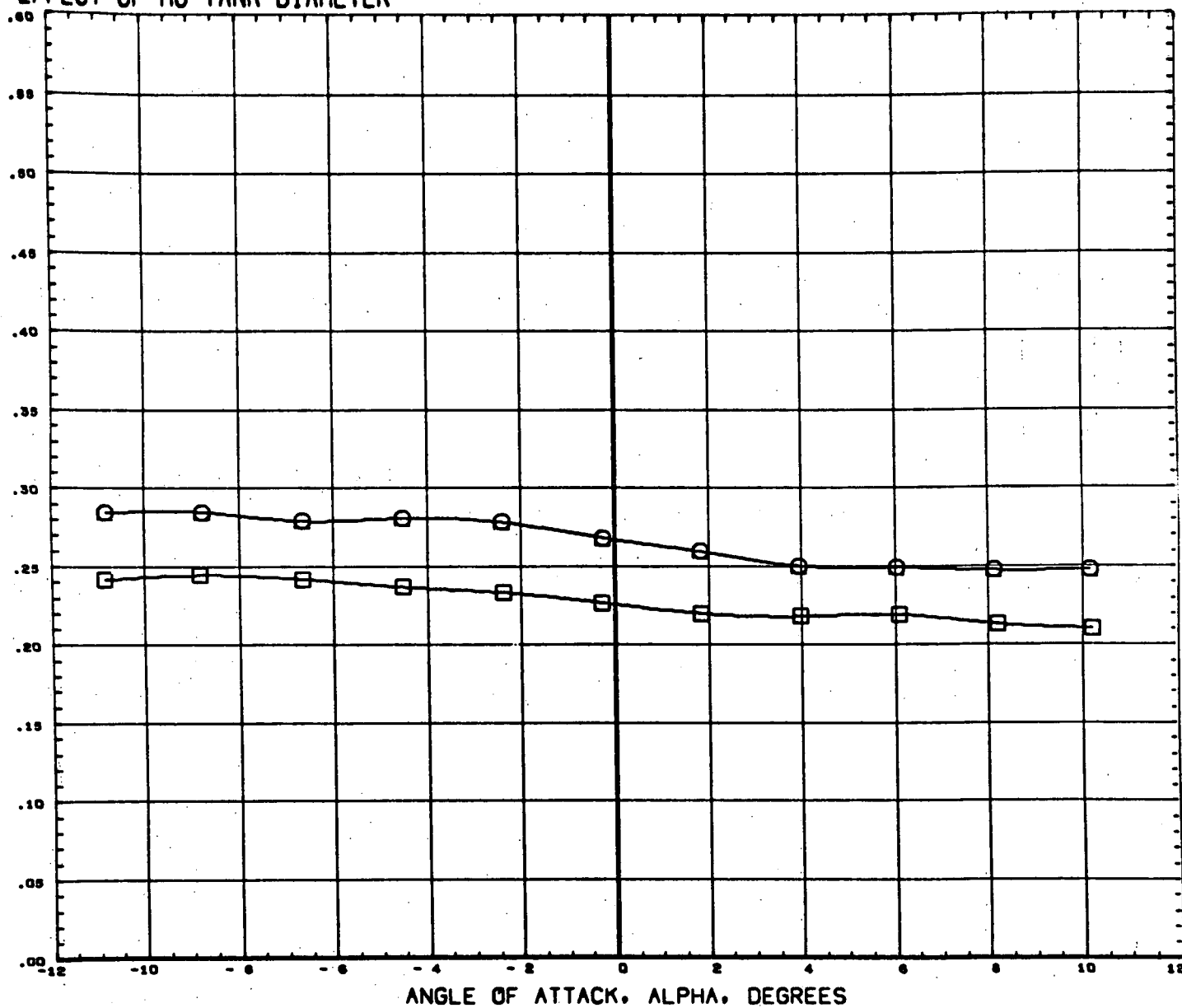
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301s1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901s1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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EFFECT OF HO TANK DIAMETER

AXIAL FORCE COEFFICIENT, CA



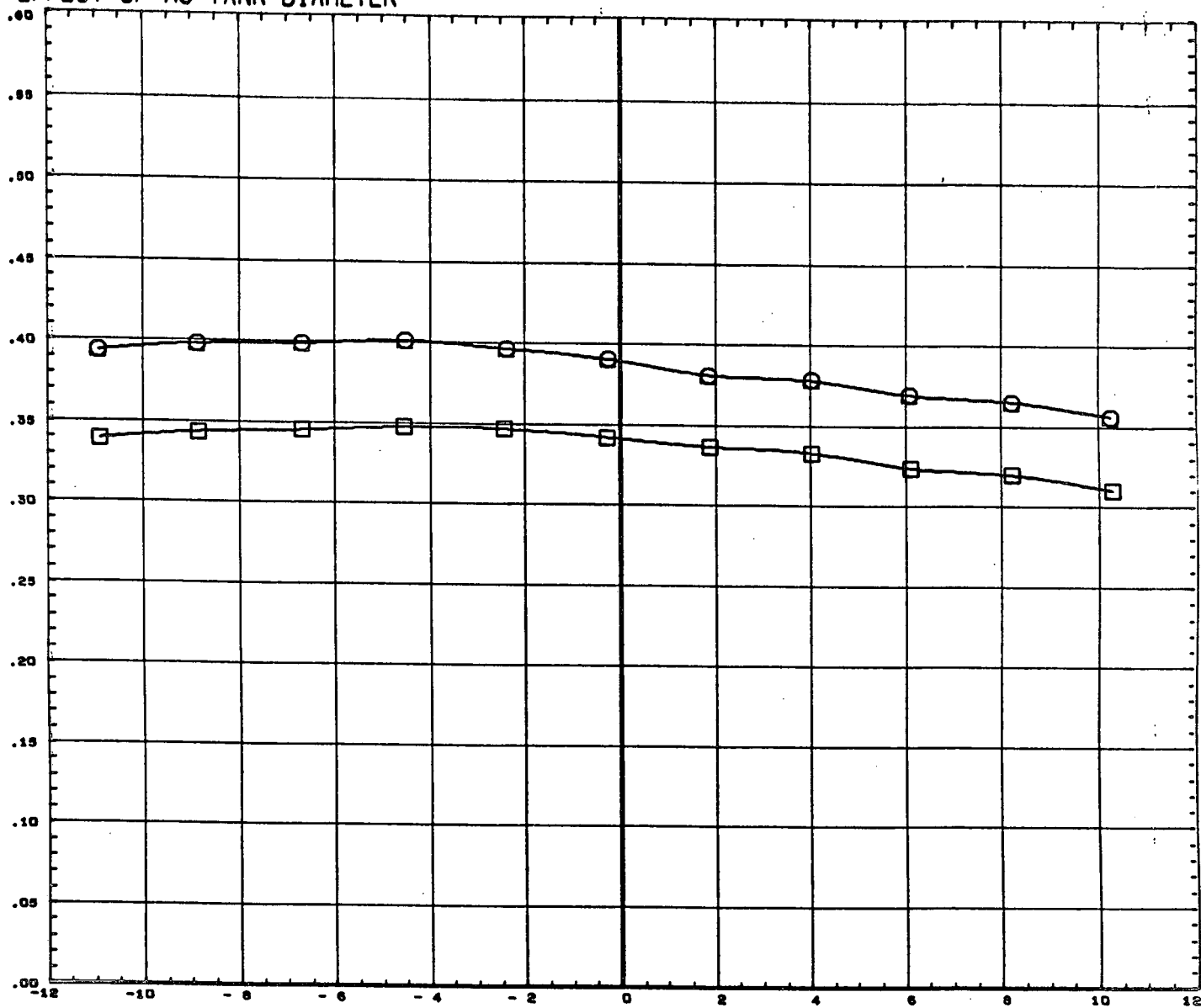
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF HO TANK DIAMETER

AXIAL FORCE COEFFICIENT, CA



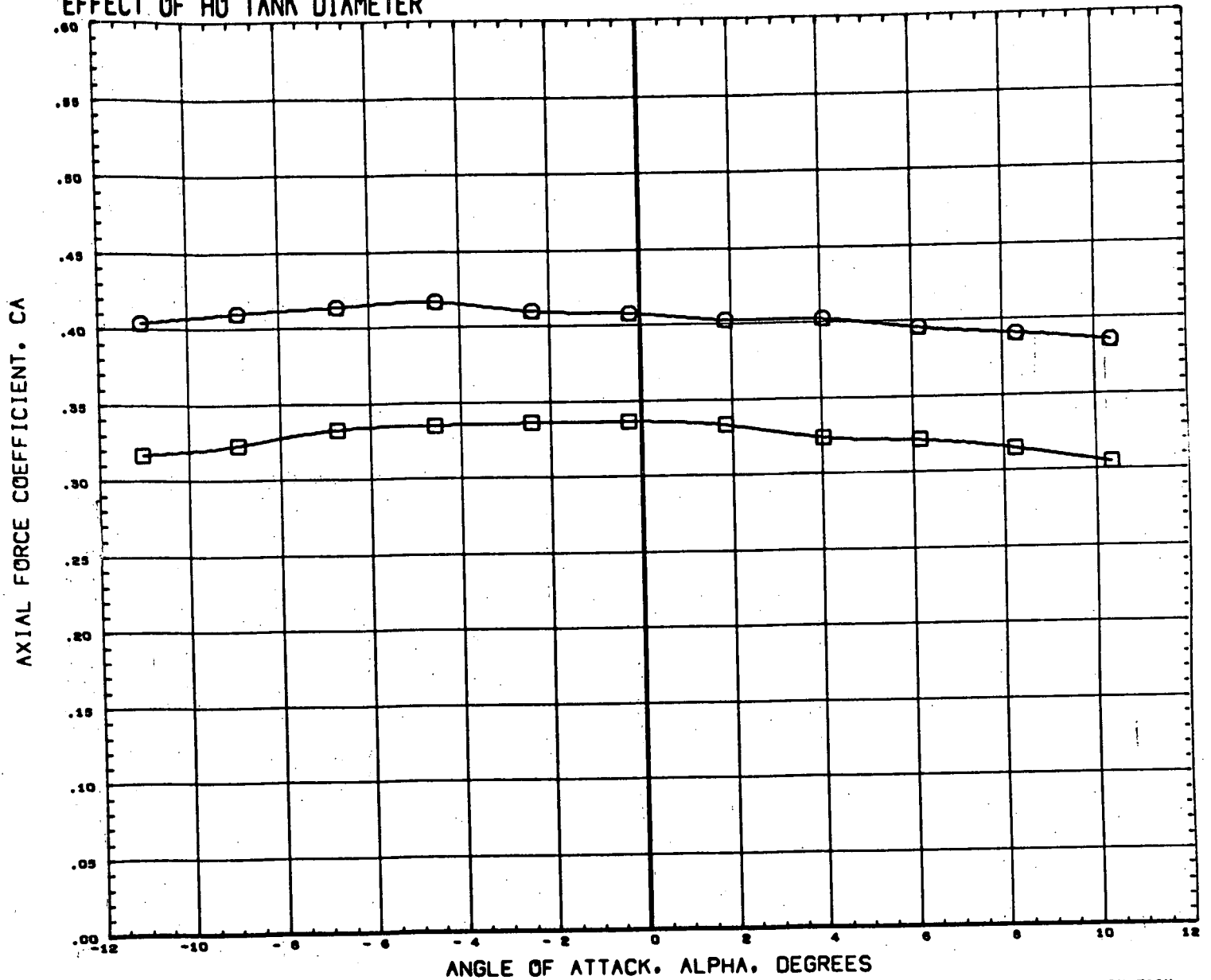
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71080) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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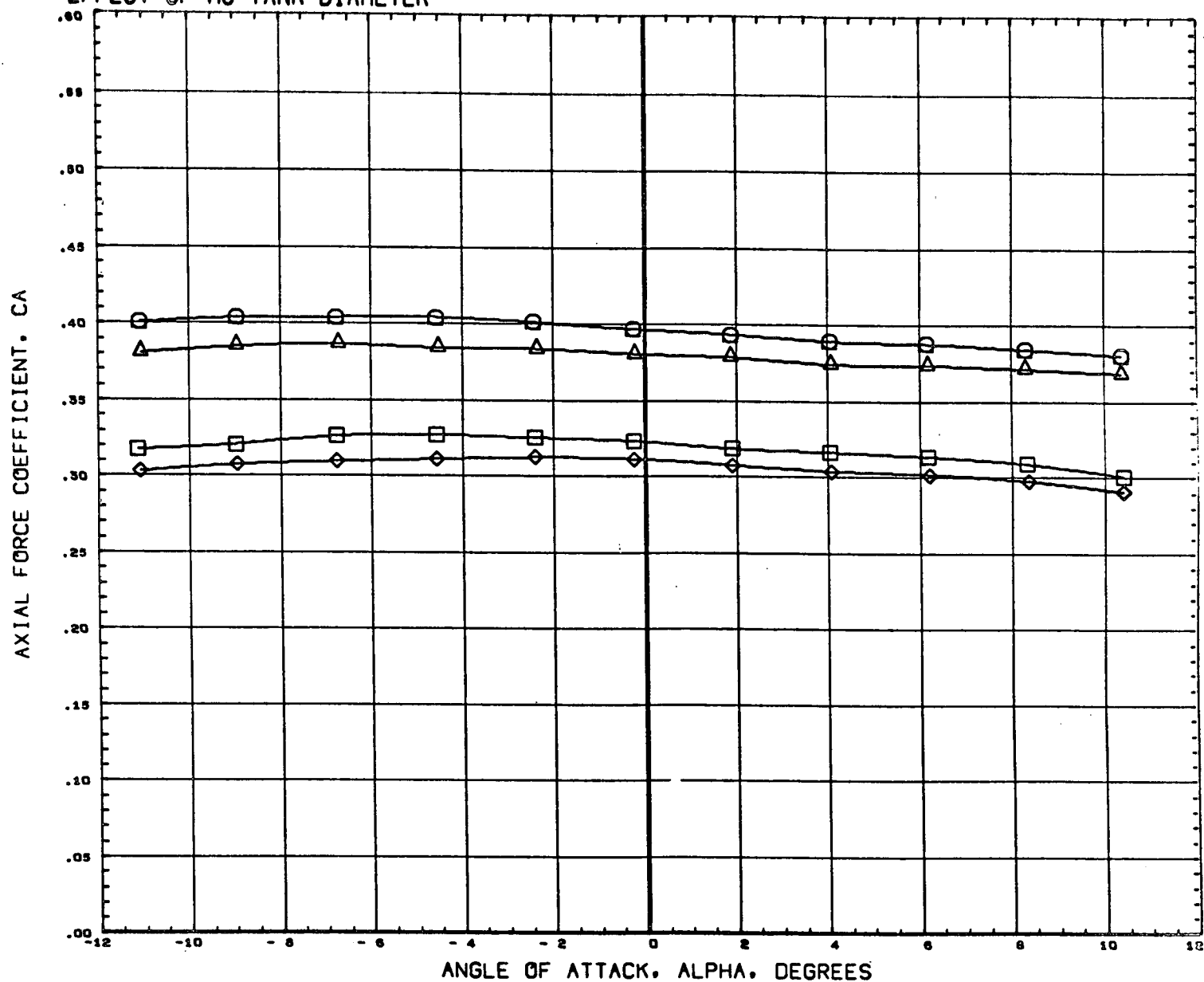
EFFECT OF HQ TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 39. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

EFFECT OF HO TANK DIAMETER

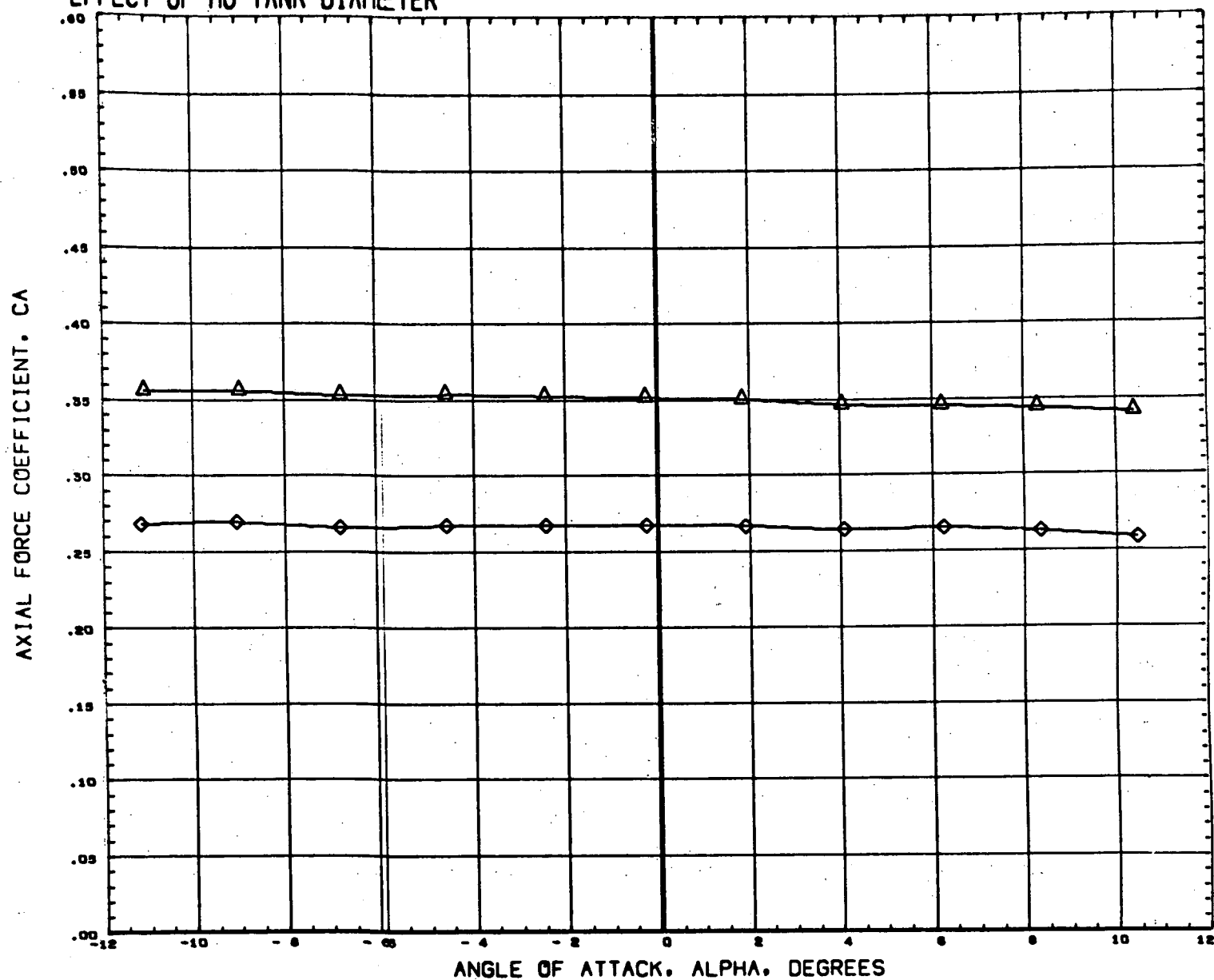


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.9800 SQ.IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF HO TANK DIAMETER



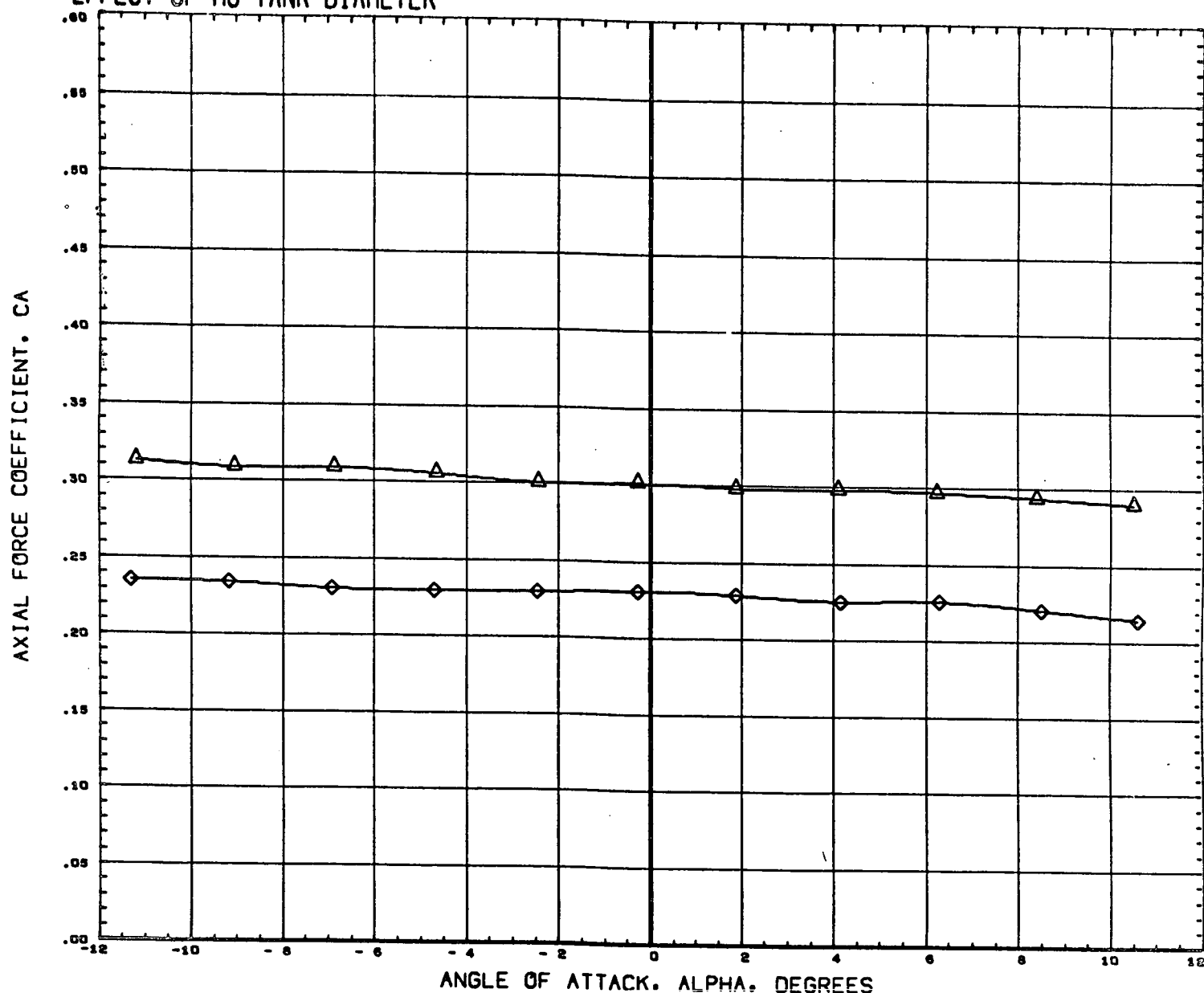
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF HO TANK DIAMETER

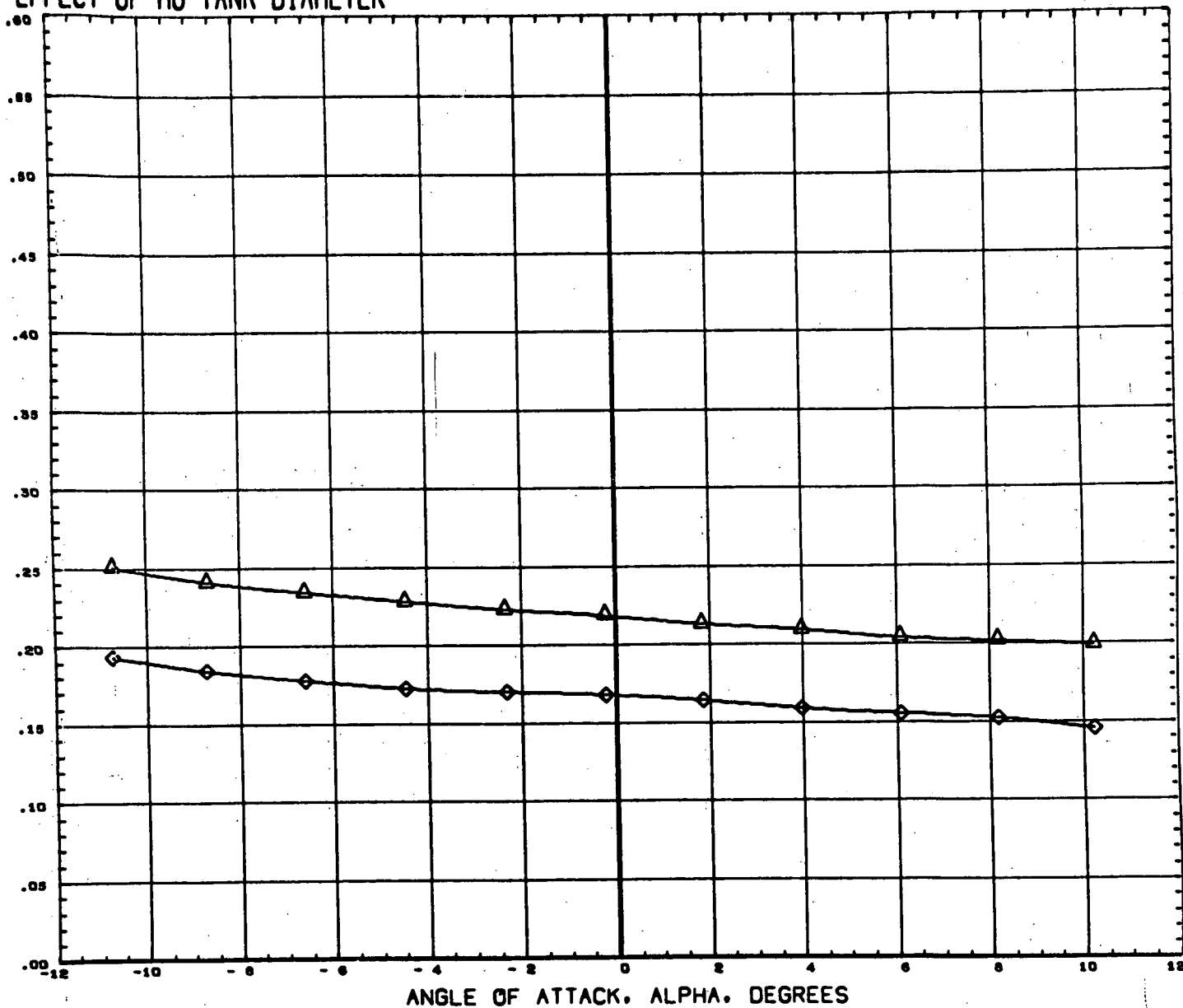


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

EFFECT OF HO TANK DIAMETER

AXIAL FORCE COEFFICIENT, CA

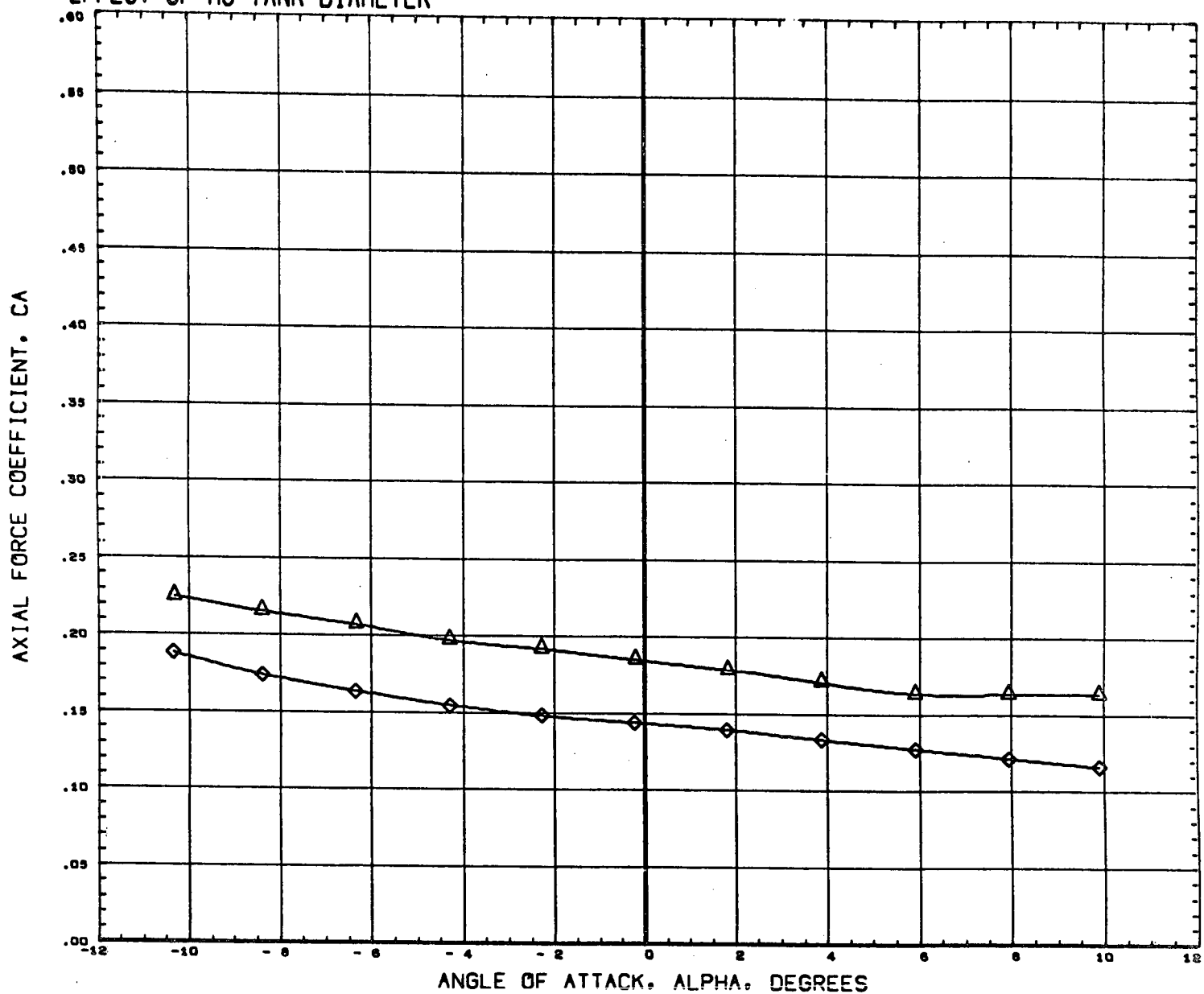


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF HO TANK DIAMETER

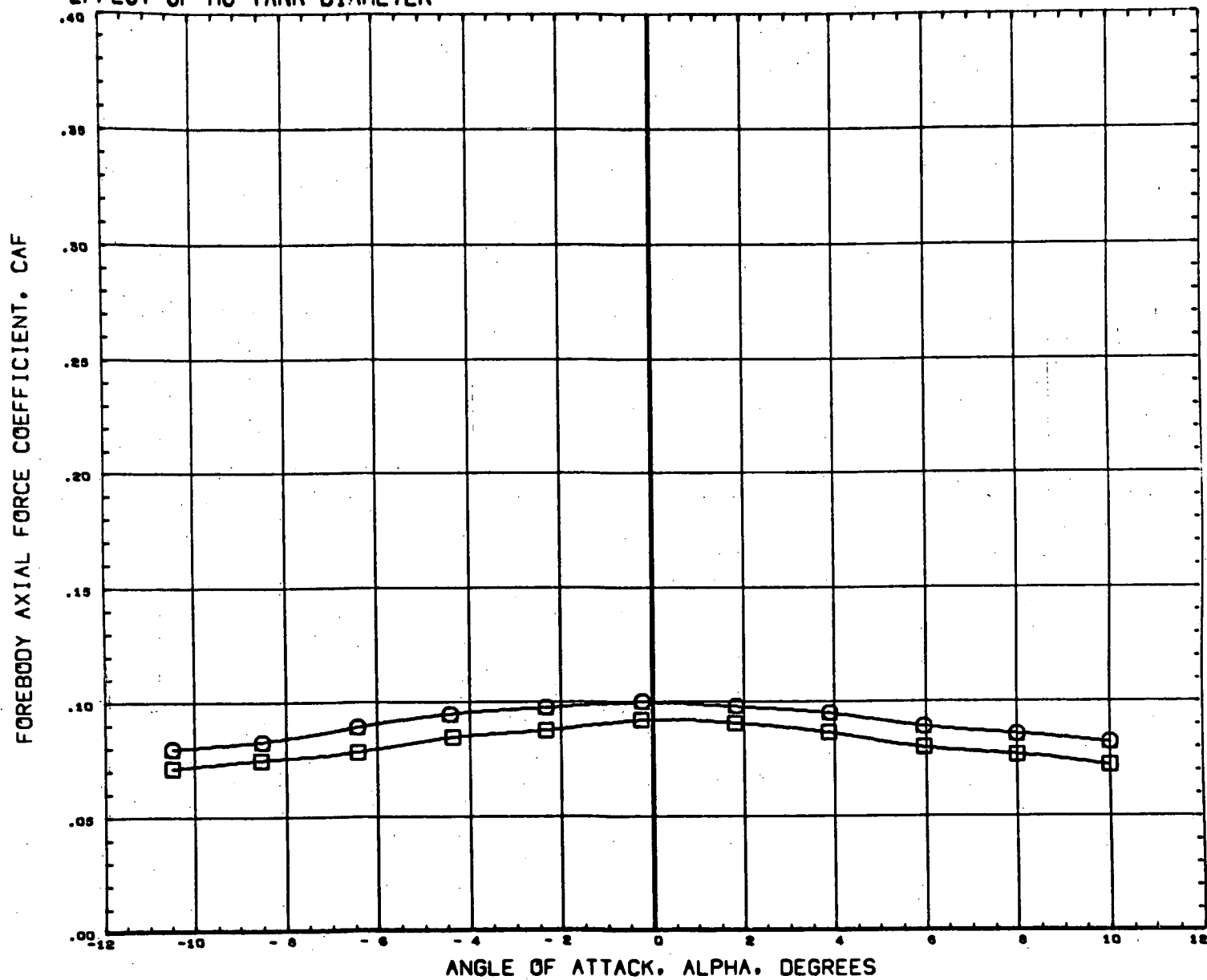


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

PAGE 100

EFFECT OF HO TANK DIAMETER

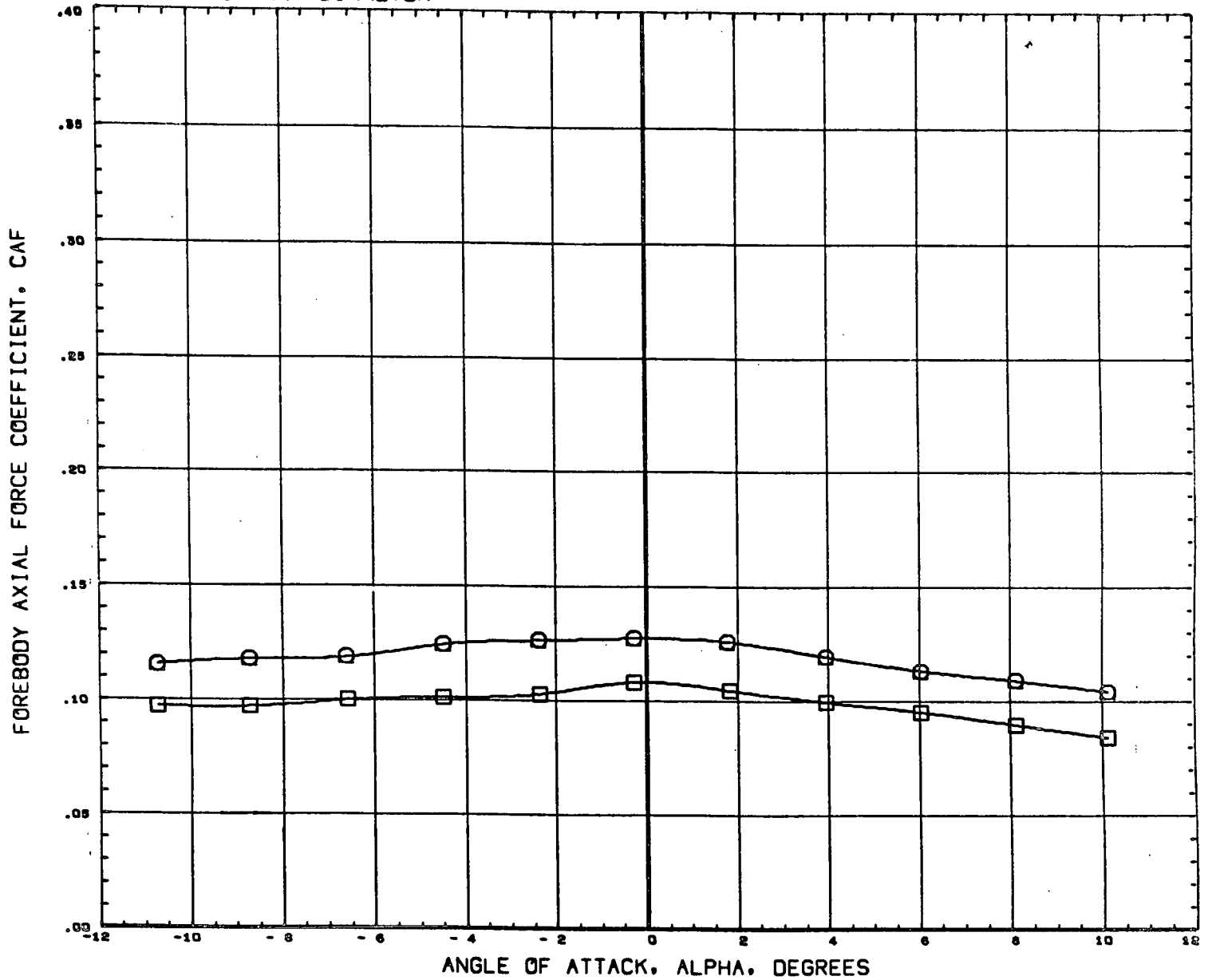


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 101

EFFECT OF HO TANK DIAMETER

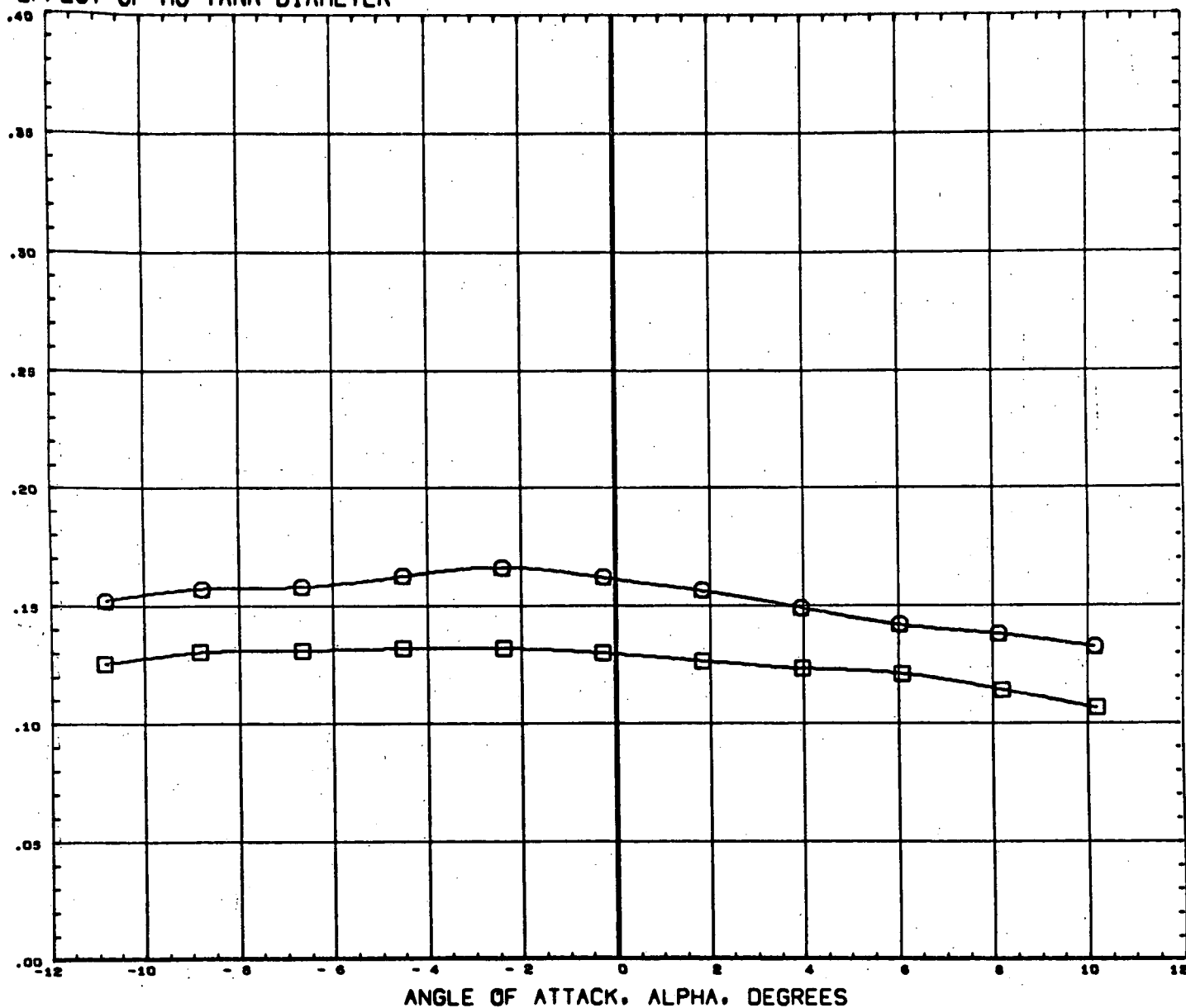


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

EFFECT OF NO TANK DIAMETER

FOREBODY AXIAL FORCE COEFFICIENT, CAF



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.025 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.025 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

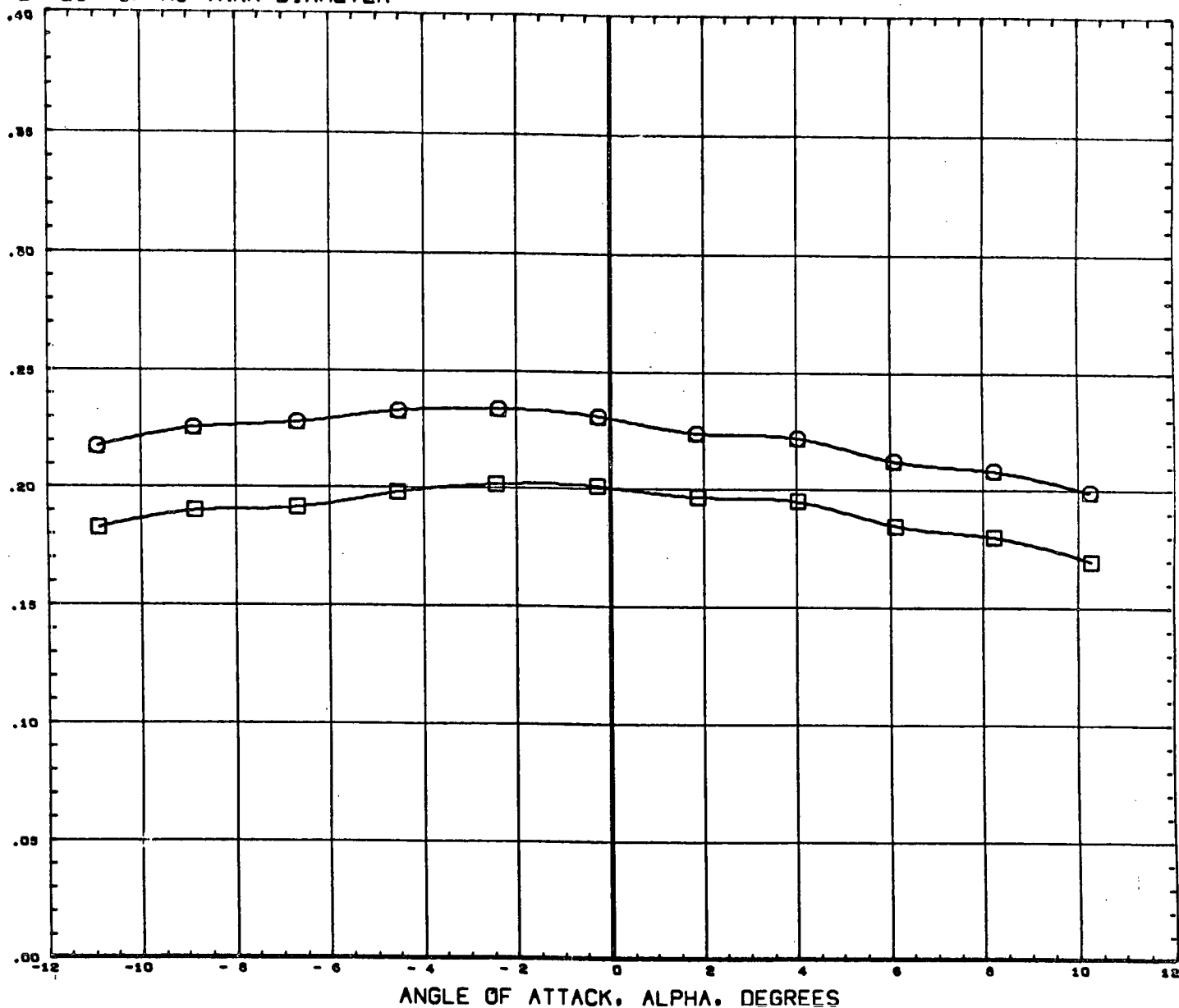
MACH

.90

PAGE 103

EFFECT OF HO TANK DIAMETER

FOREBODY AXIAL FORCE COEFFICIENT, CAF

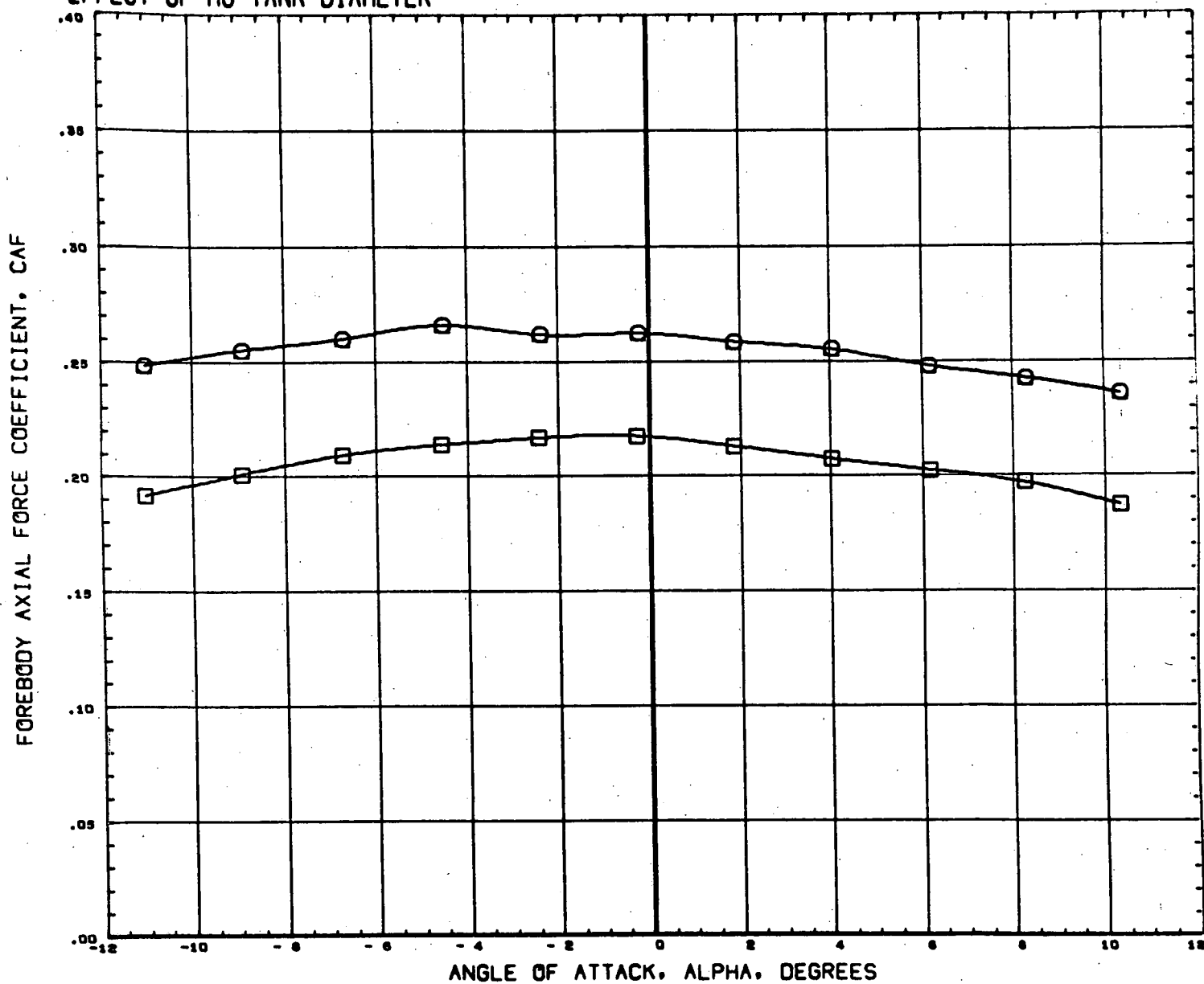


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071005) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF H0 TANK DIAMETER



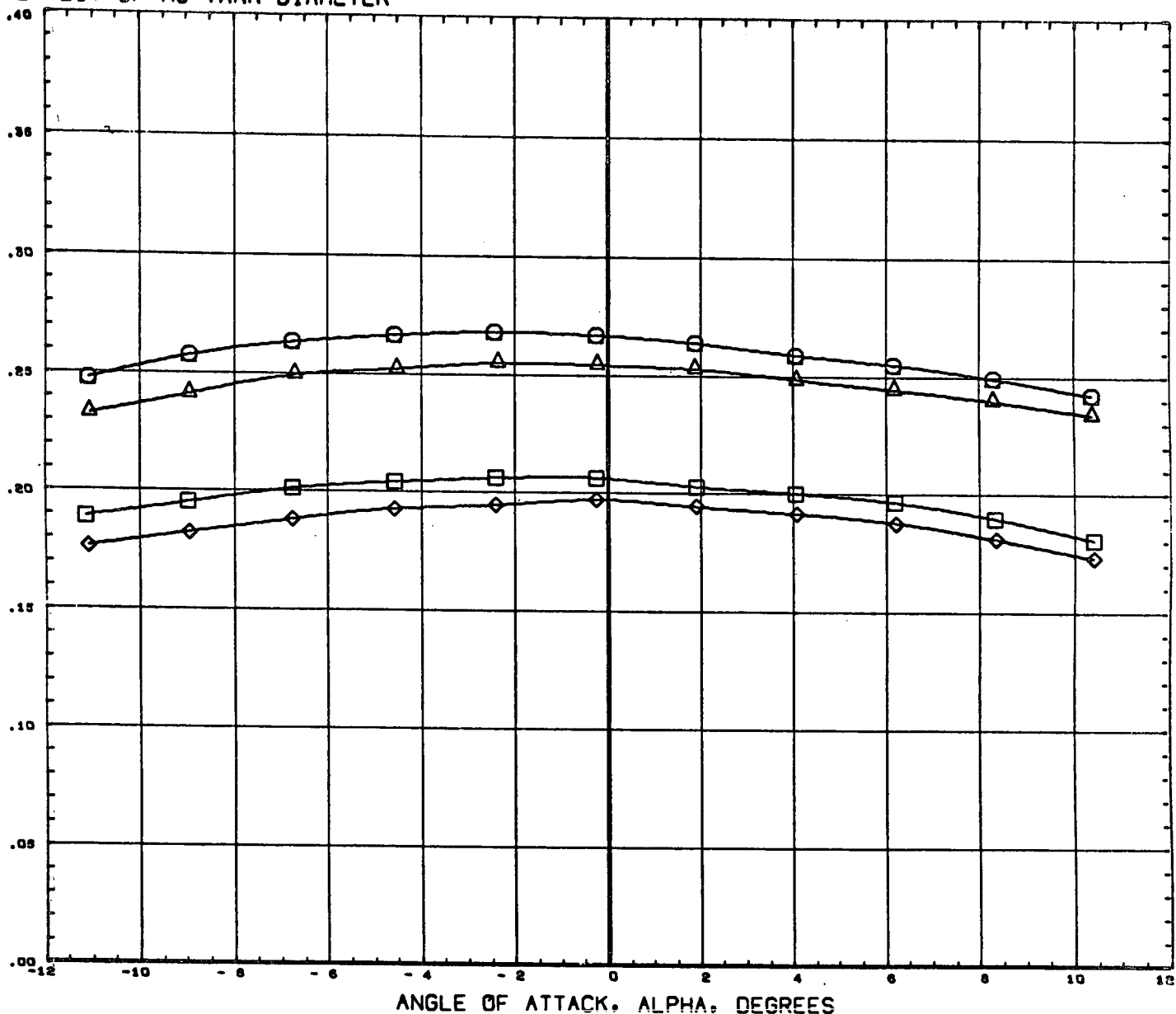
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

PAGE 105

EFFECT OF HO TANK DIAMETER

FOREBODY AXIAL FORCE COEFFICIENT, CAF



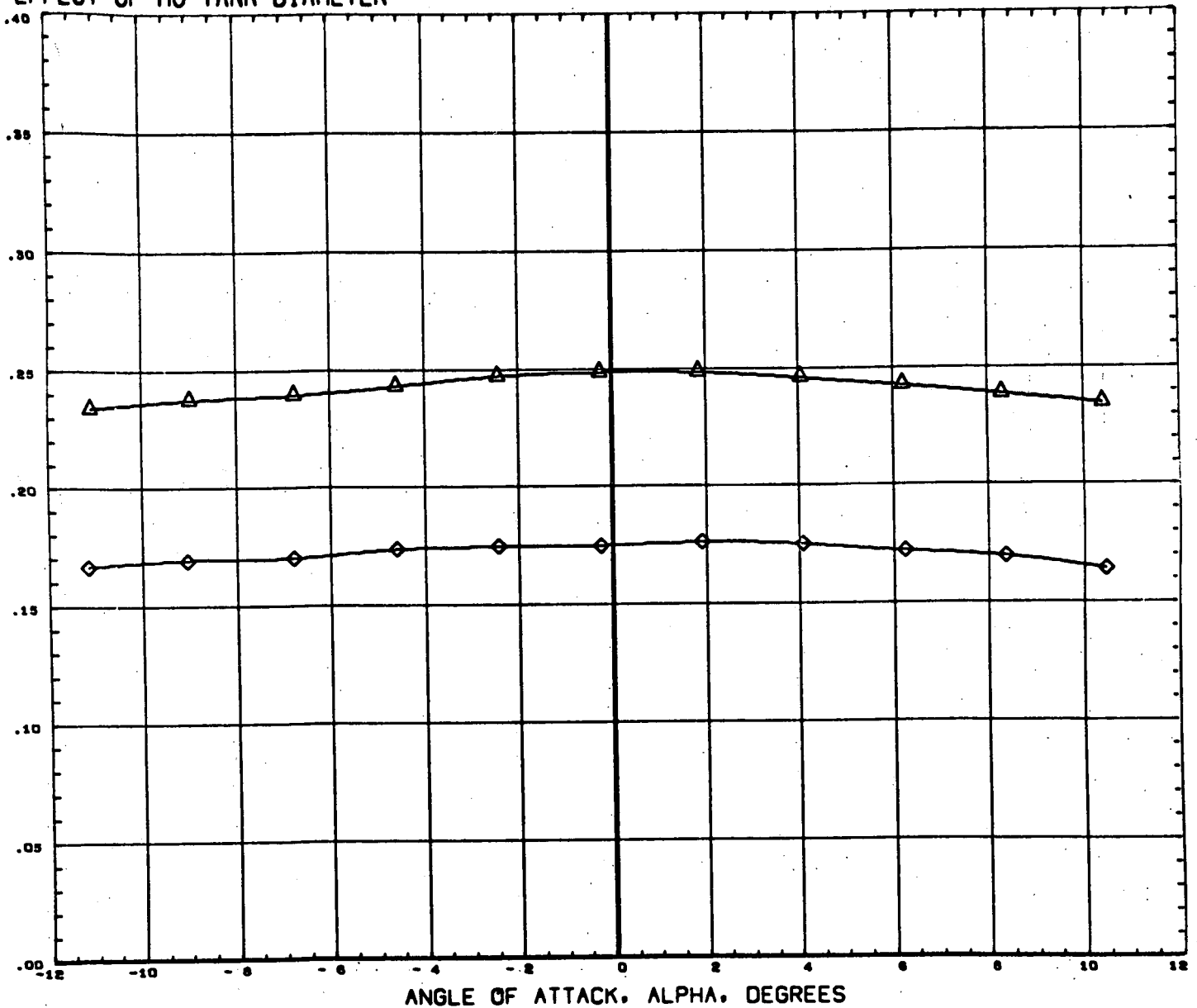
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF H₀ TANK DIAMETER

FOREBODY AXIAL FORCE COEFFICIENT, CAF



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

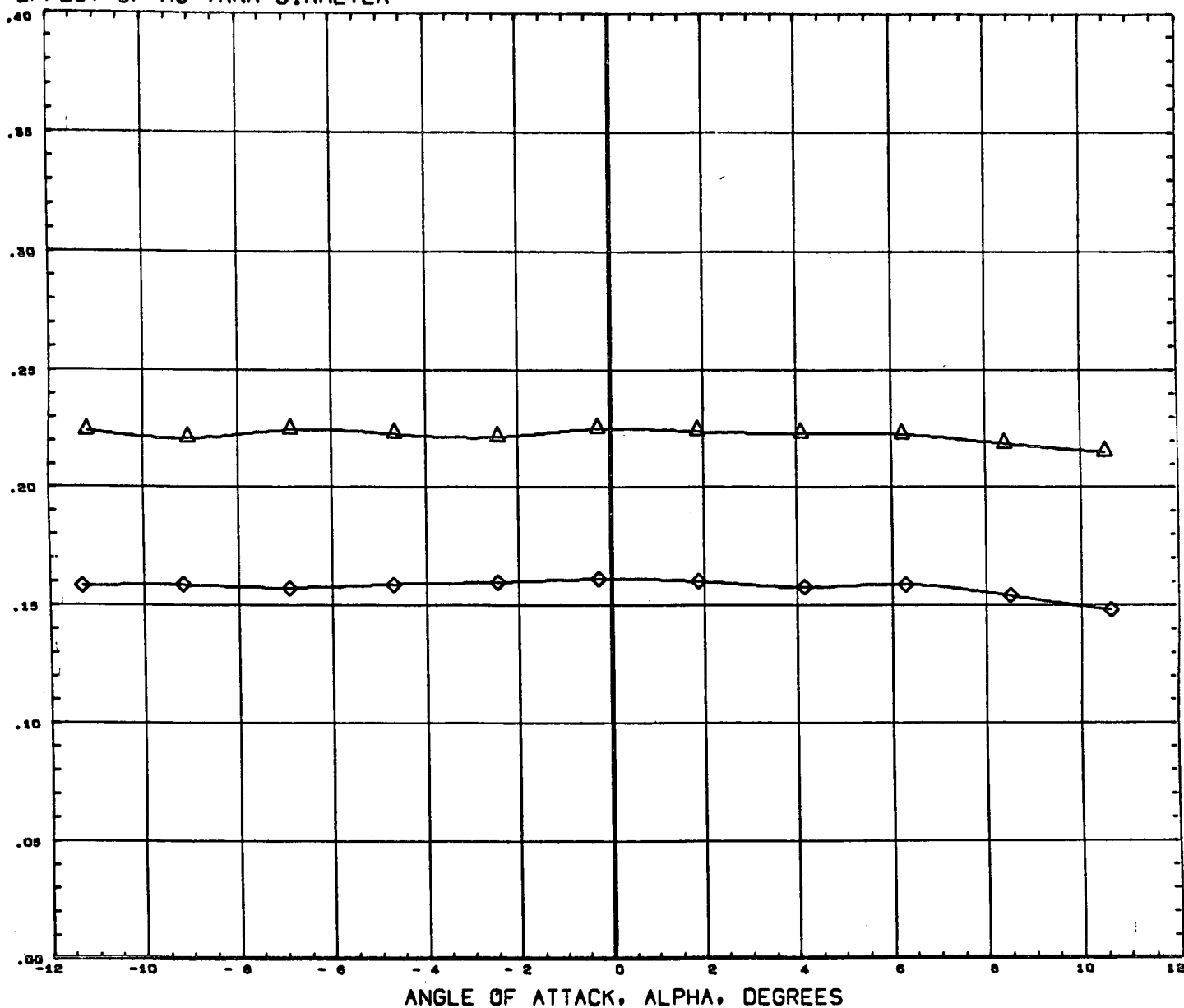
MACH

1.46

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EFFECT OF NO TANK DIAMETER

FOREBODY AXIAL FORCE COEFFICIENT, CAF



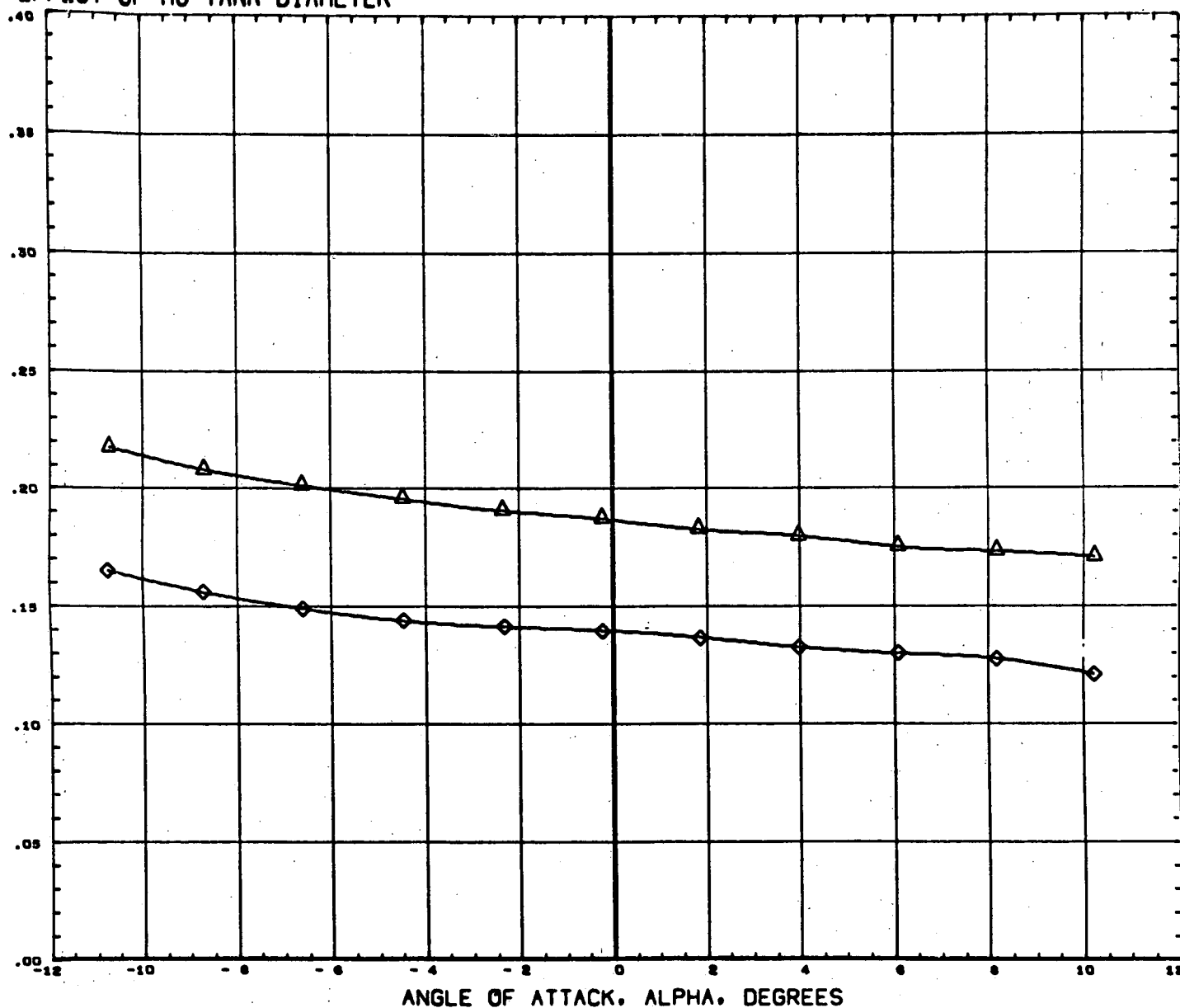
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71009) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF HO TANK DIAMETER

FOREBODY AXIAL FORCE COEFFICIENT, CAF



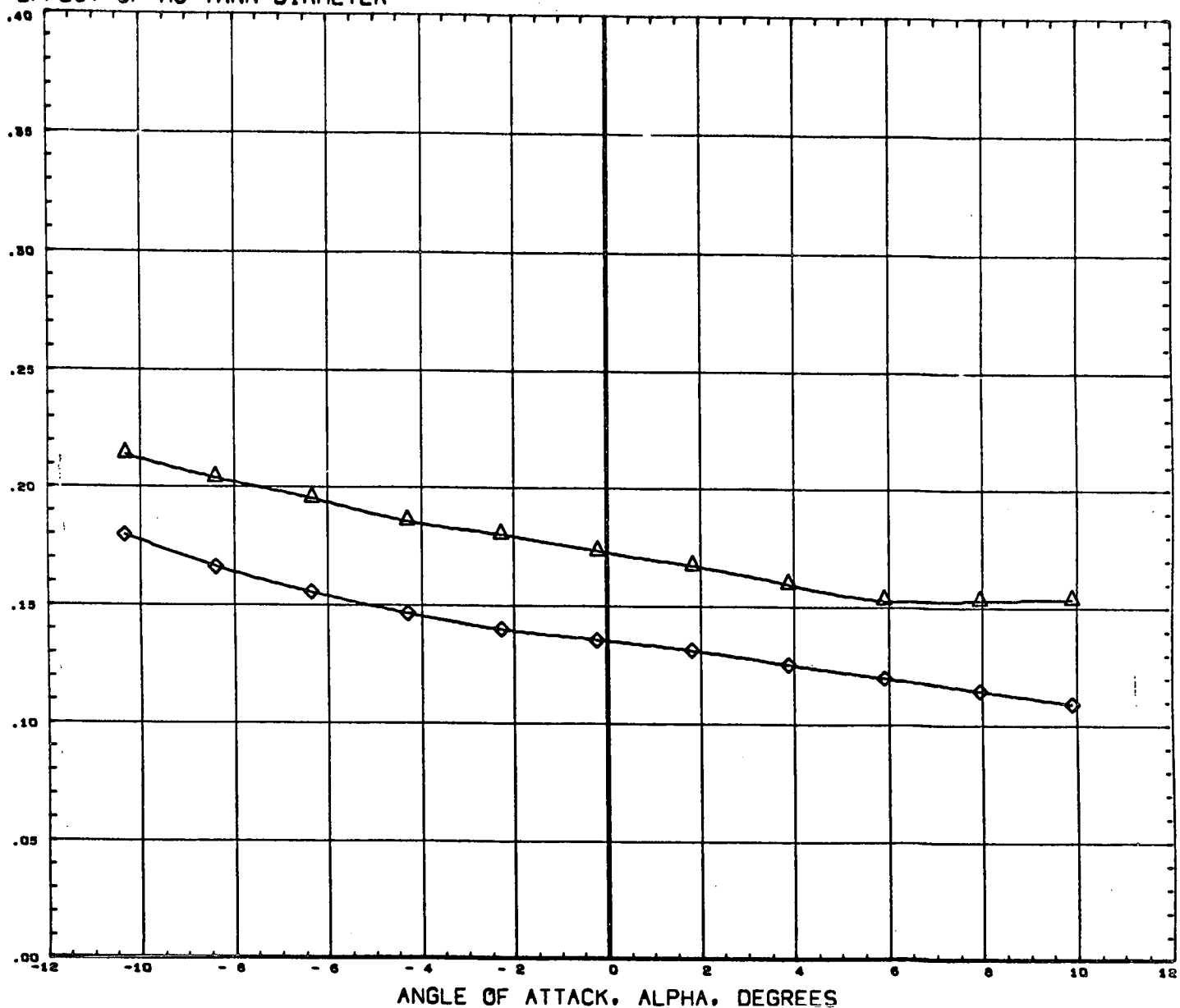
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30281 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90281 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF HO TANK DIAMETER

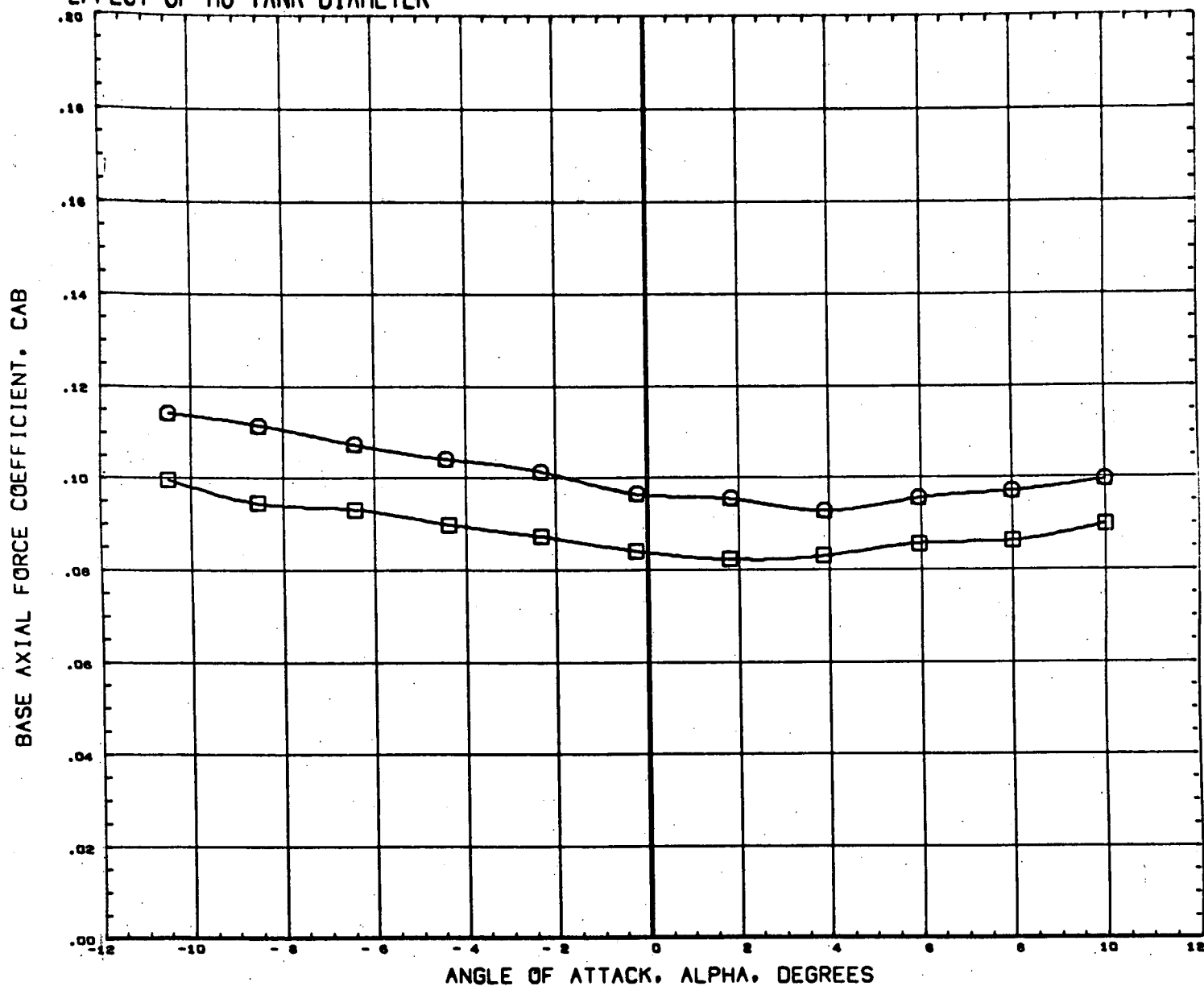
FOREBODY AXIAL FORCE COEFFICIENT, CAF



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

EFFECT OF HO TANK DIAMETER

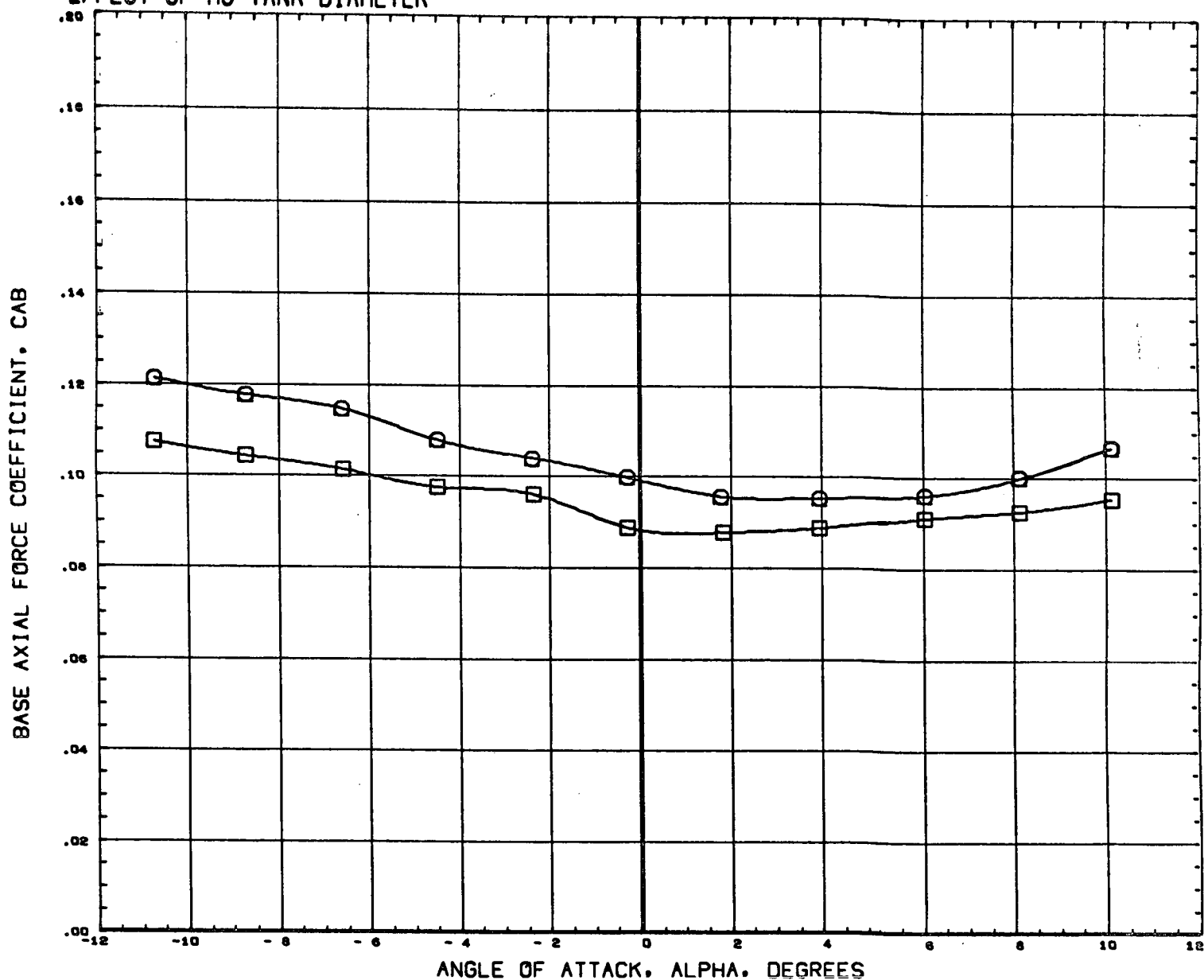


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 50. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF HO TANK DIAMETER



ANGLE OF ATTACK, ALPHA, DEGREES

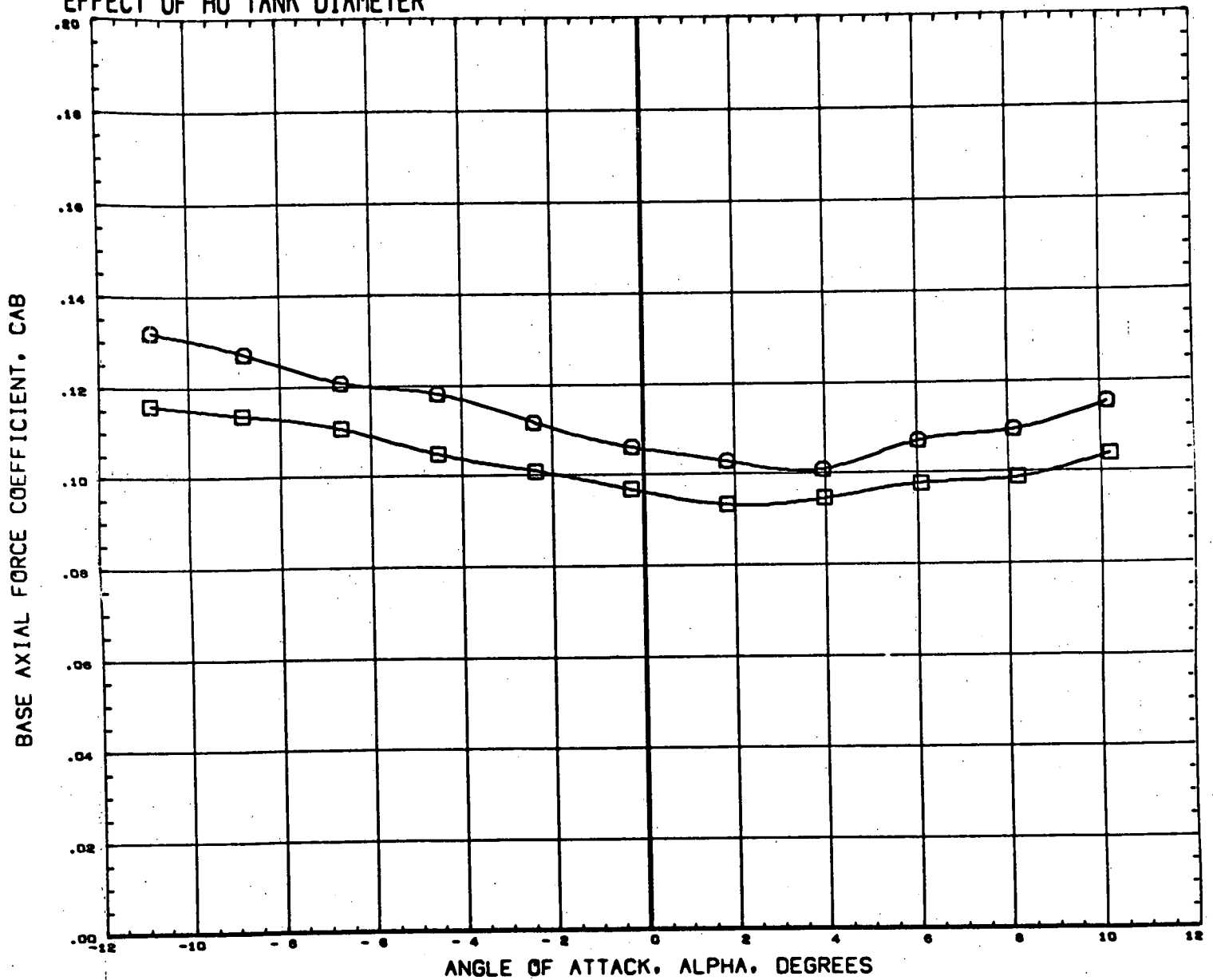
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | FRUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|---------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.80

PAGE 112

EFFECT OF HO TANK DIAMETER

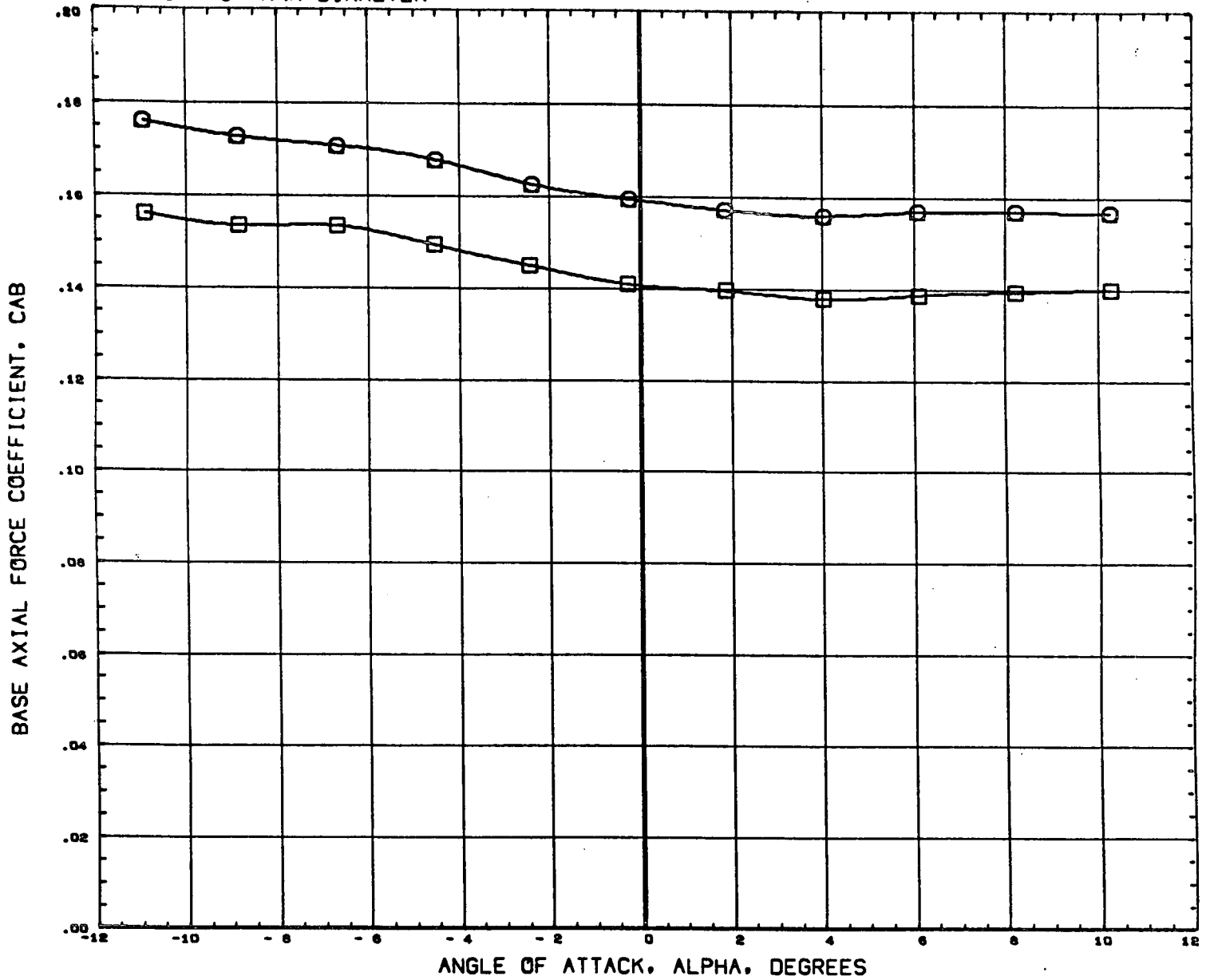


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF HO TANK DIAMETER

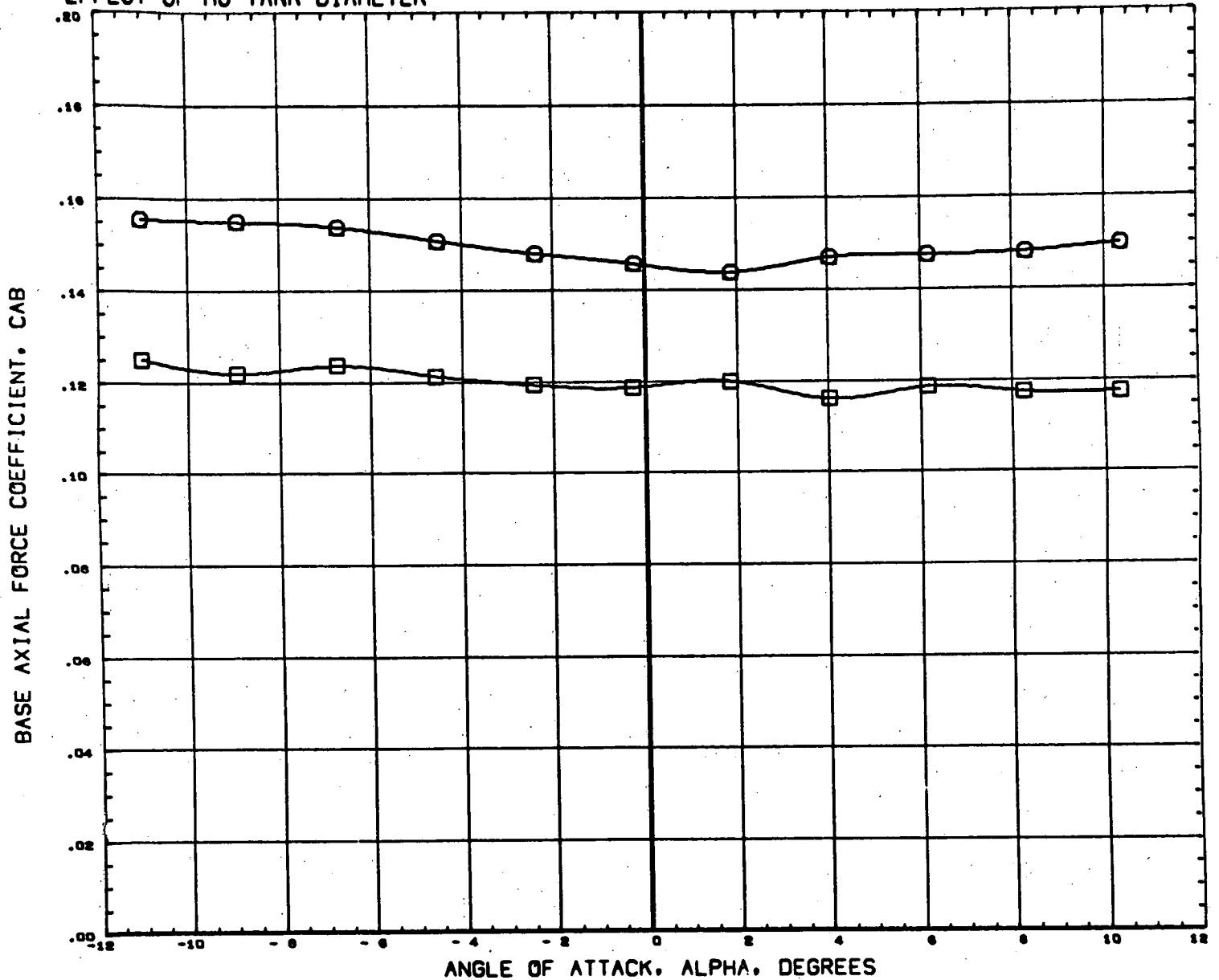


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF HO TANK DIAMETER

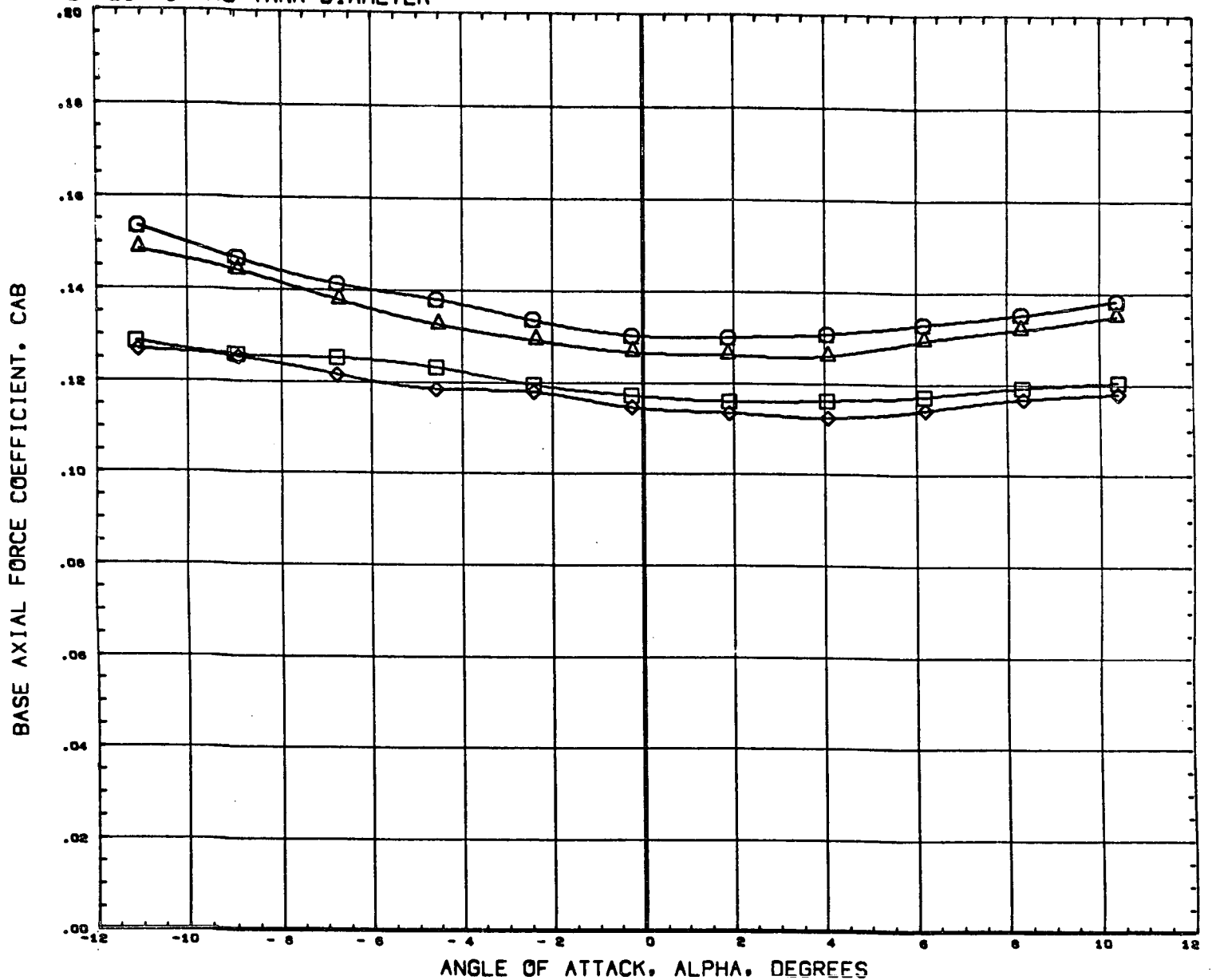


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T50151 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90151 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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EFFECT OF HO TANK DIAMETER

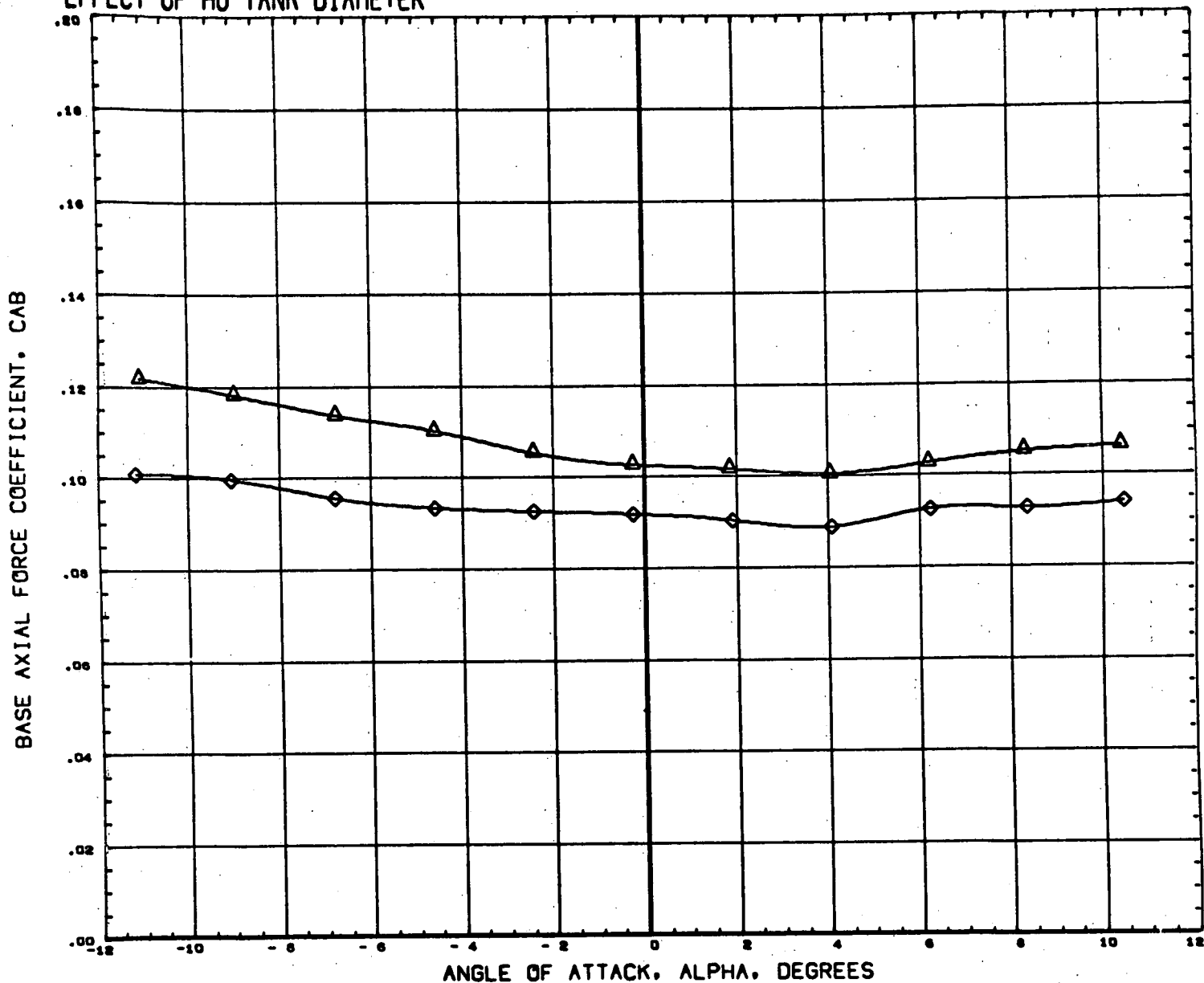


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90281 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF HO TANK DIAMETER



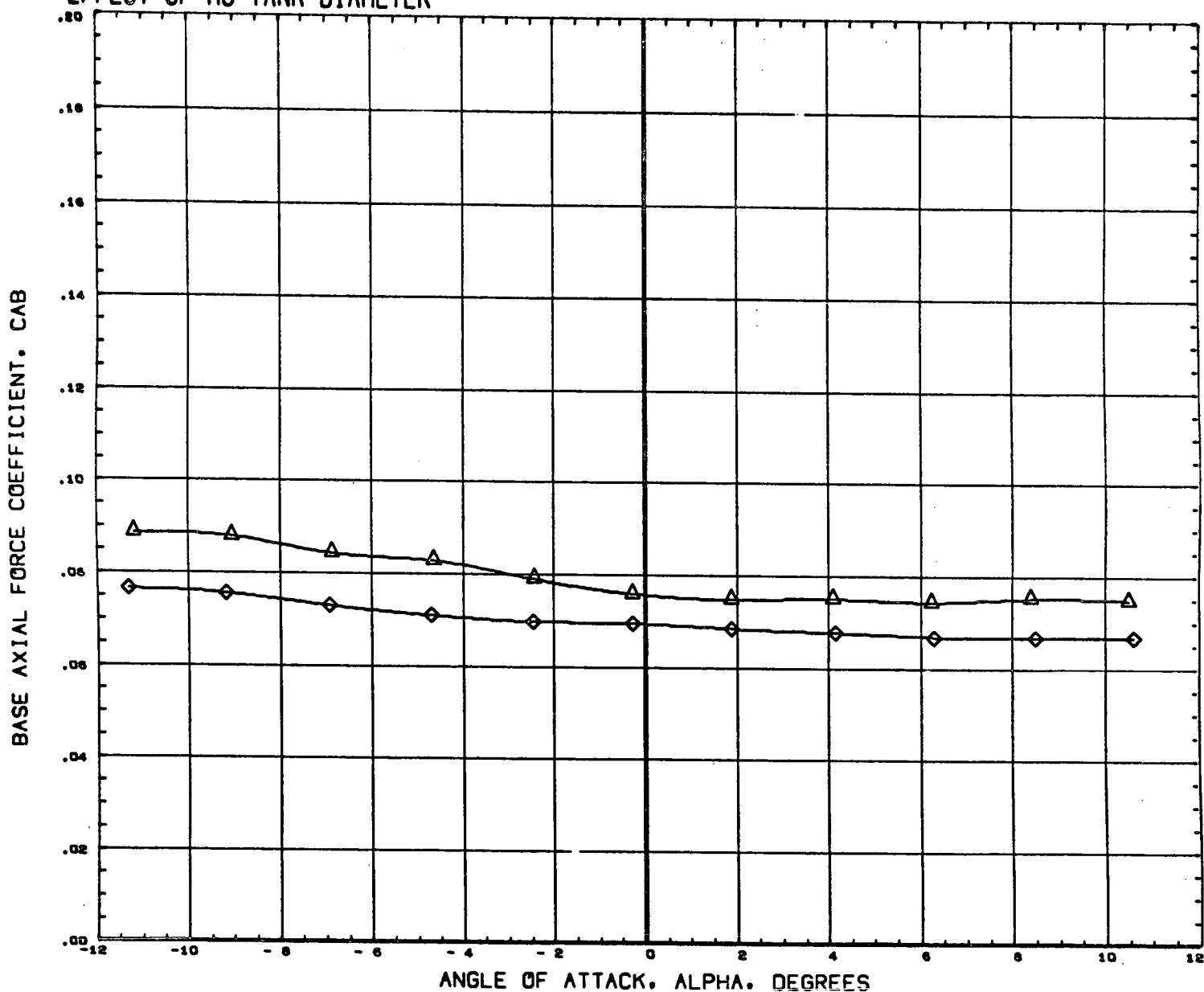
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871133) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

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EFFECT OF HO TANK DIAMETER

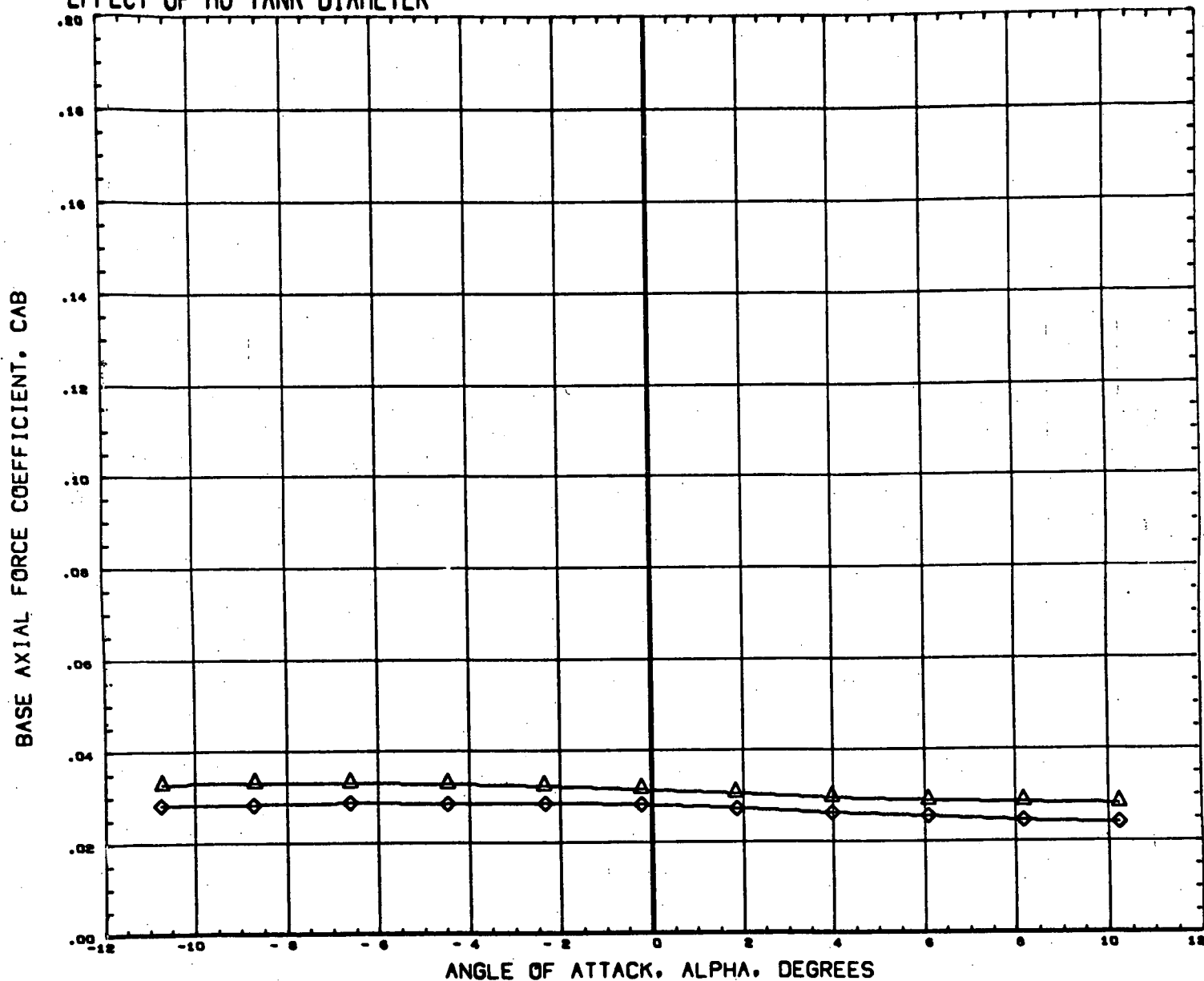


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF HO TANK DIAMETER

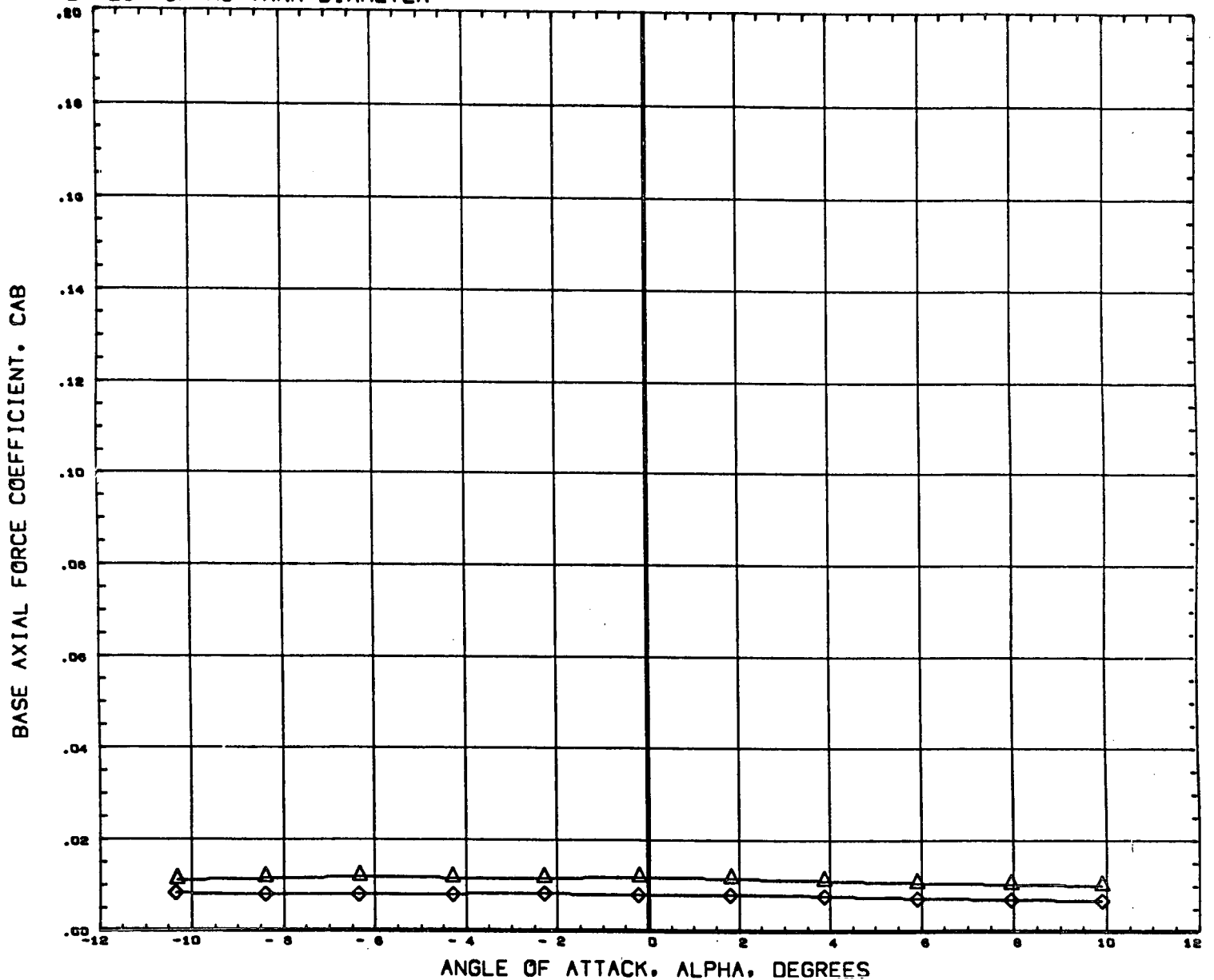


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF H₀ TANK DIAMETER

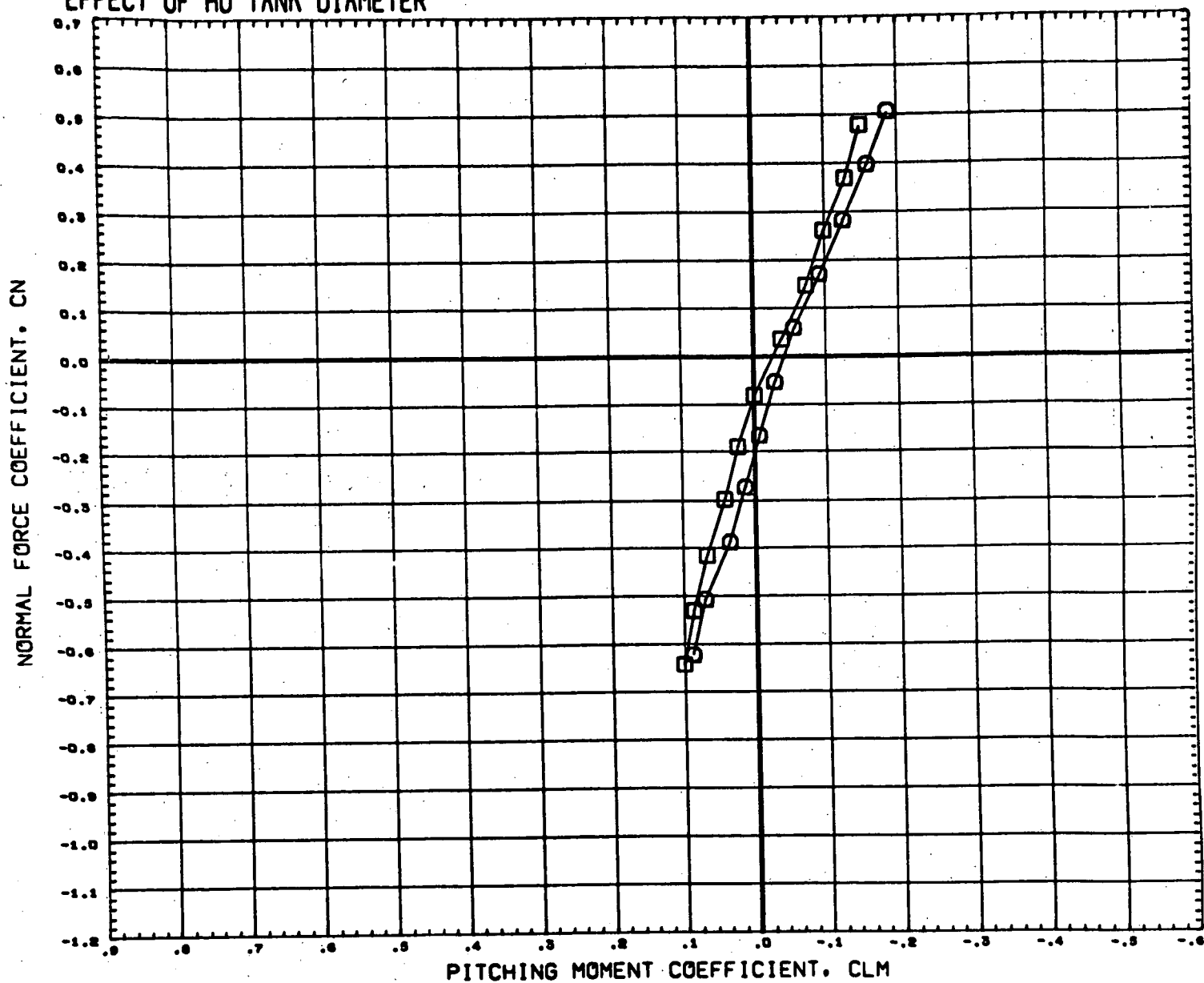


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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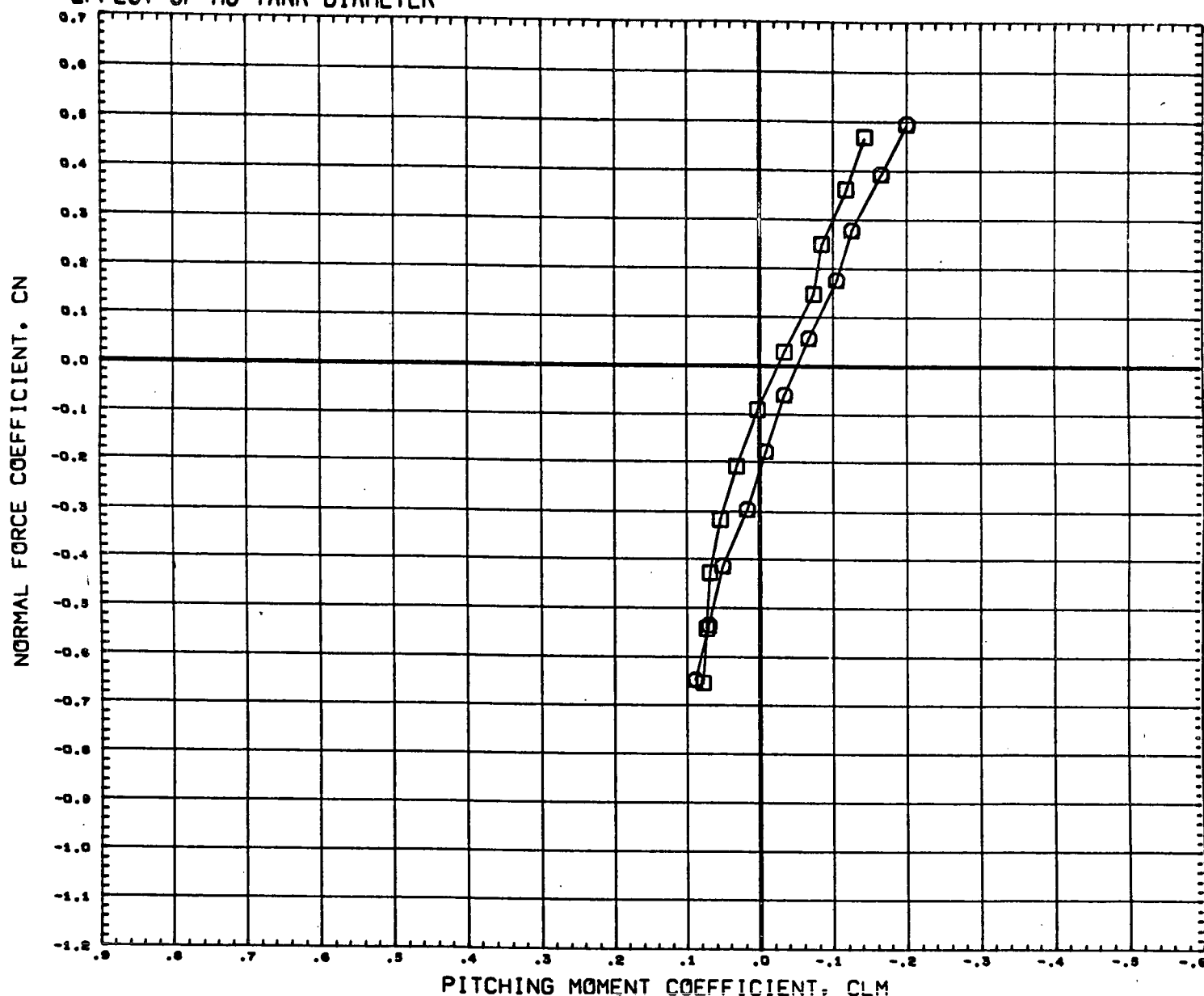
EFFECT OF H0 TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | GRF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

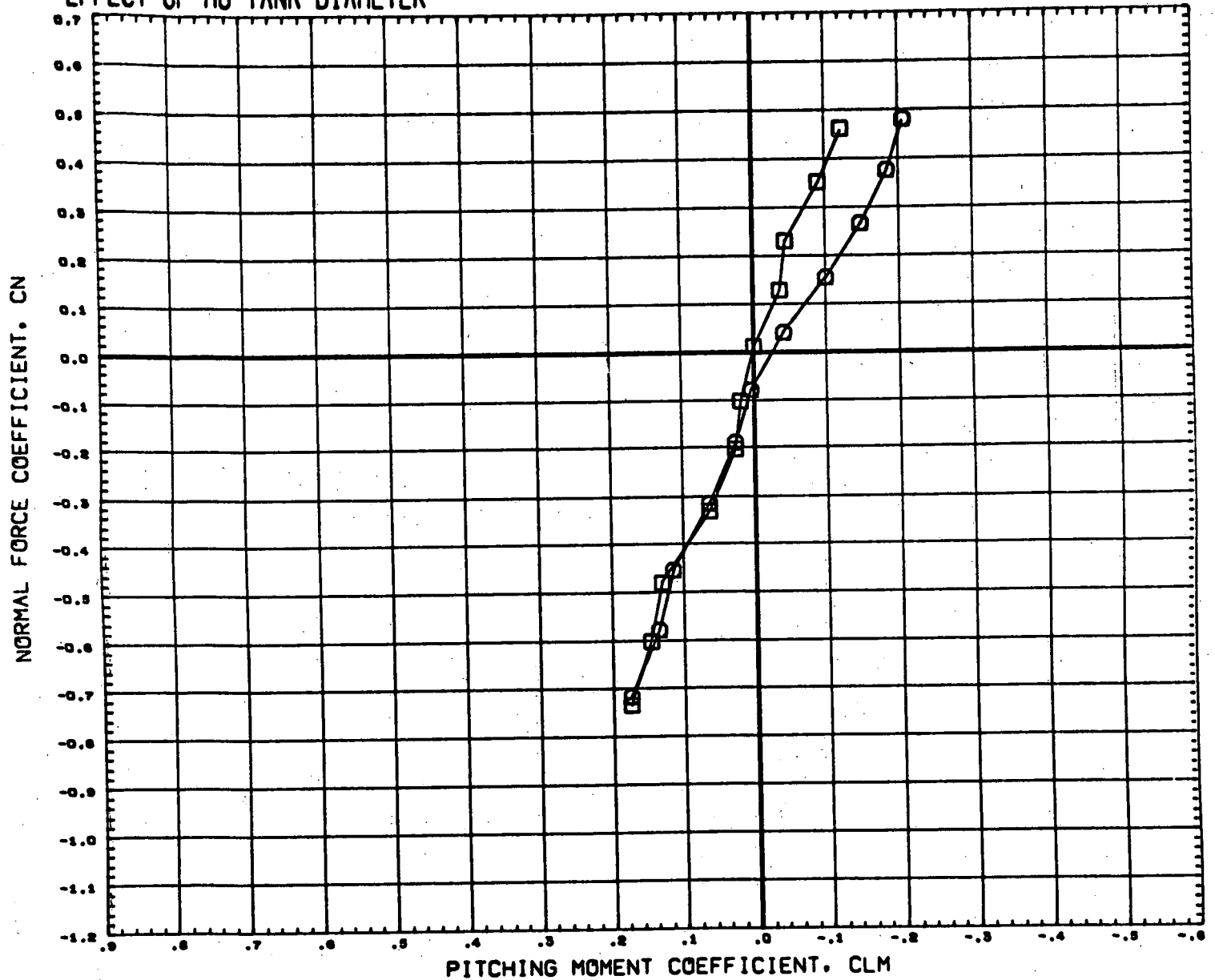
EFFECT OF H₀ TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

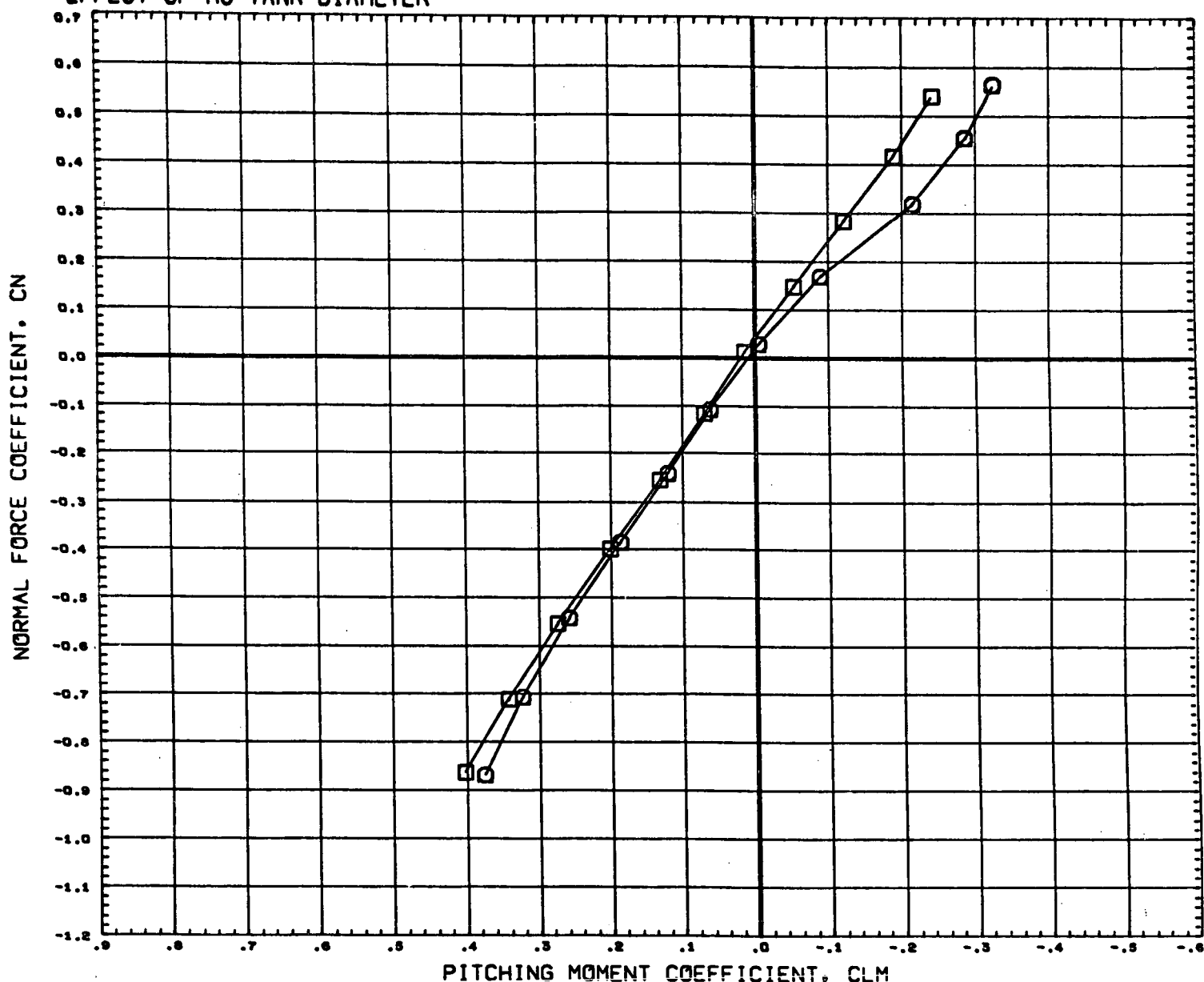
EFFECT OF HQ TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XNRP | 3.3600 IN. |
| | | | | | | YNRP | 0.0000 IN. |
| | | | | | | ZNRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

EFFECT OF HO TANK DIAMETER

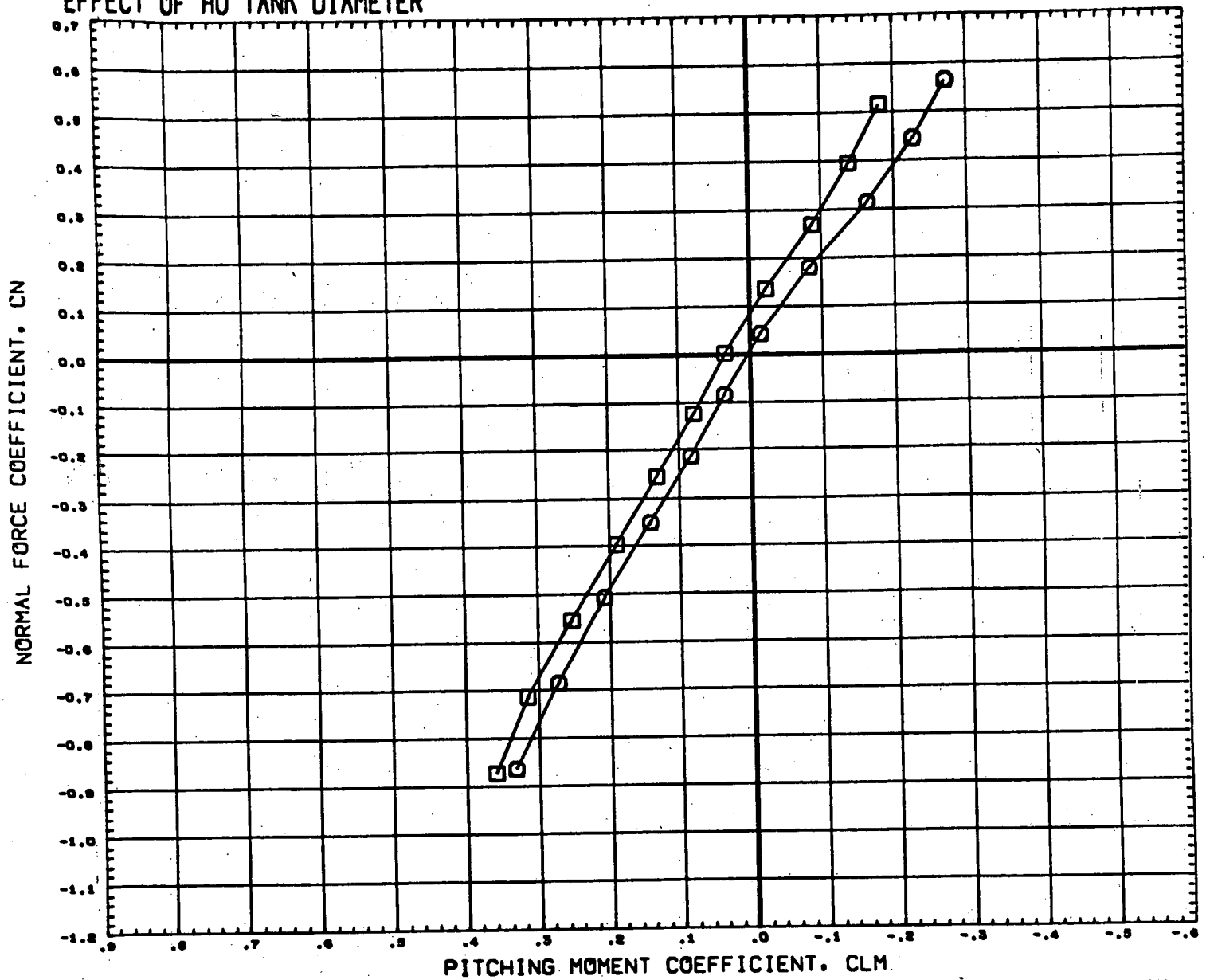


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF HO TANK DIAMETER

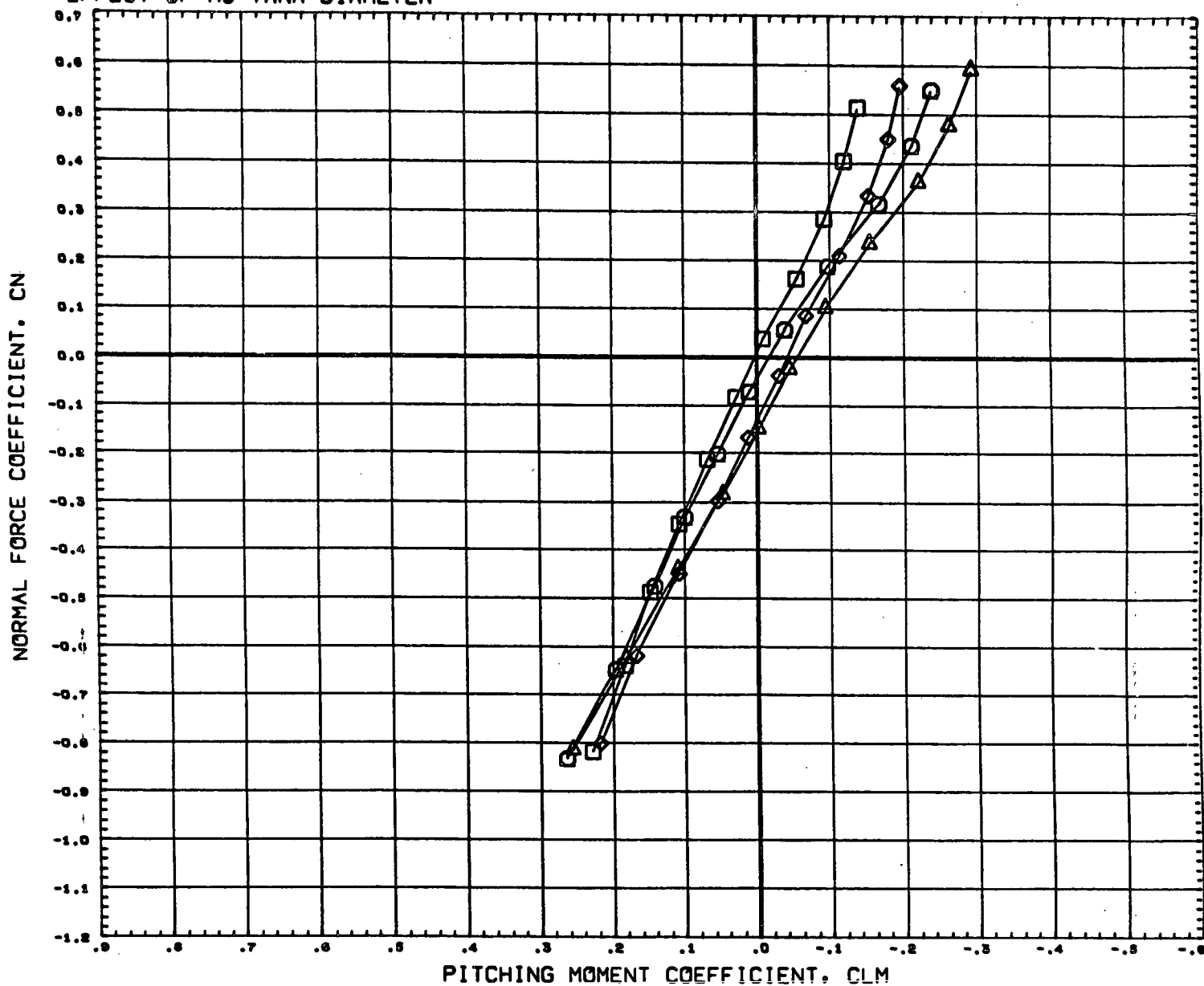


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITAL | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|---------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ.IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.10

EFFECT OF H₀ TANK DIAMETER

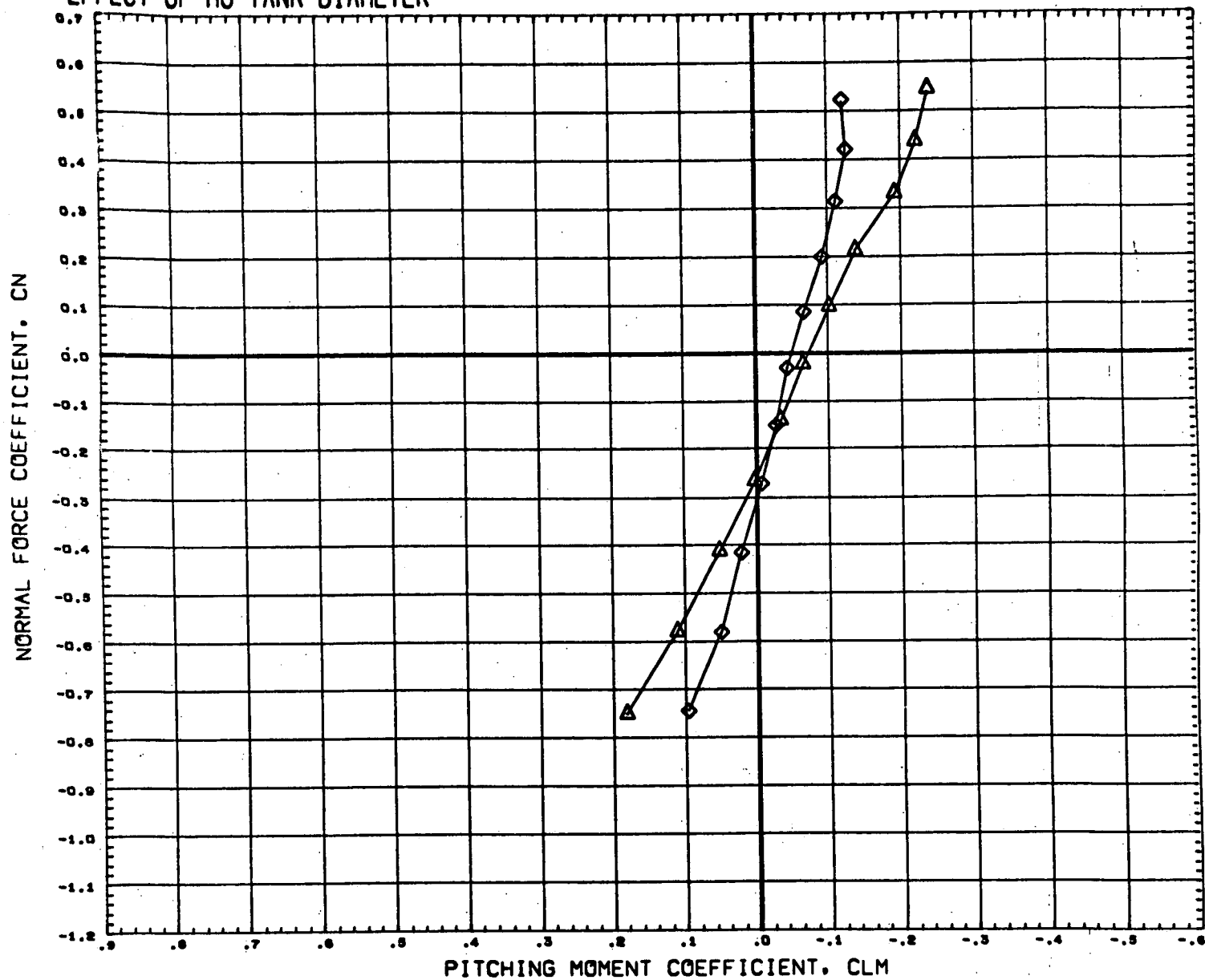


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF H₀ TANK DIAMETER

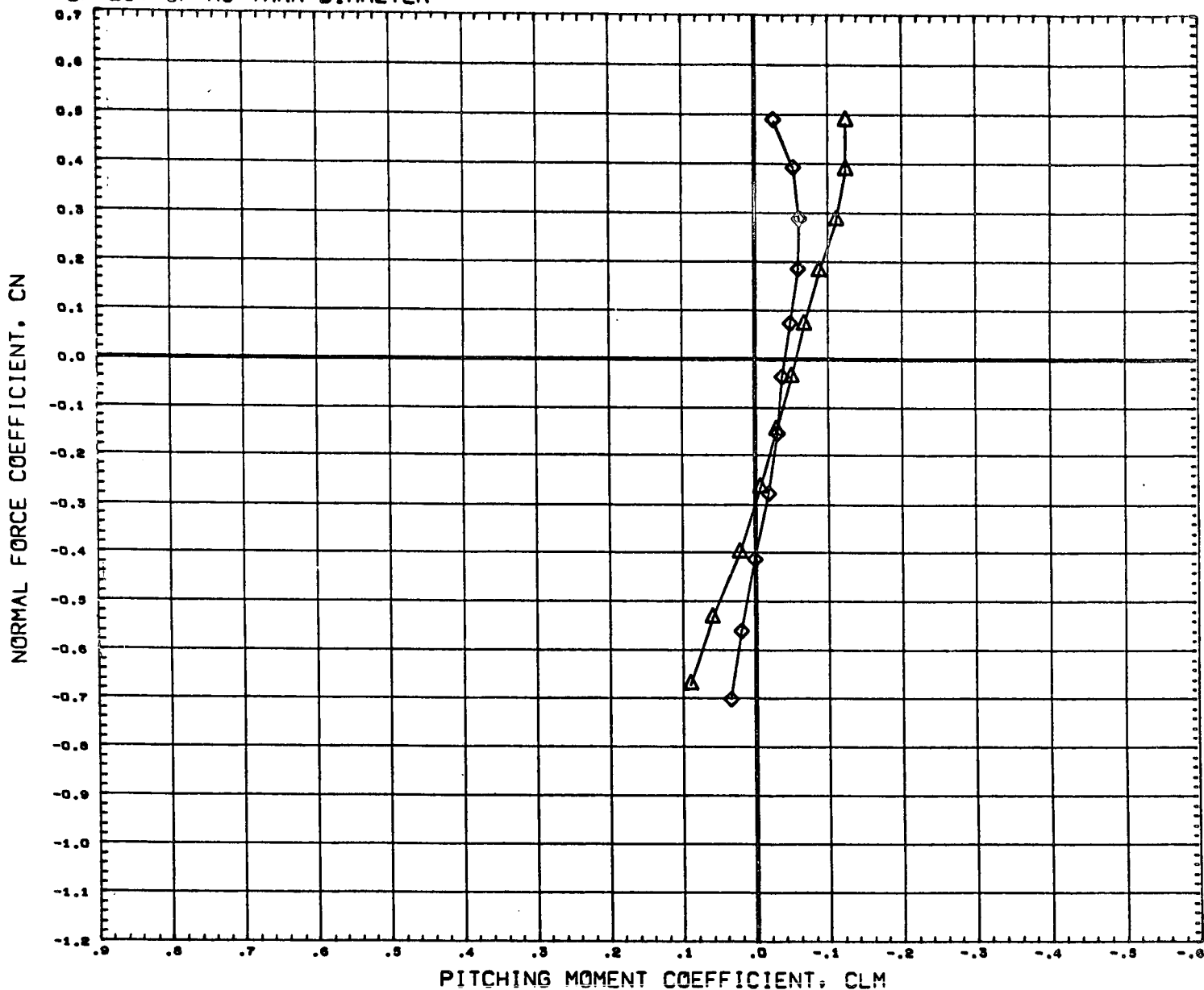


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 30. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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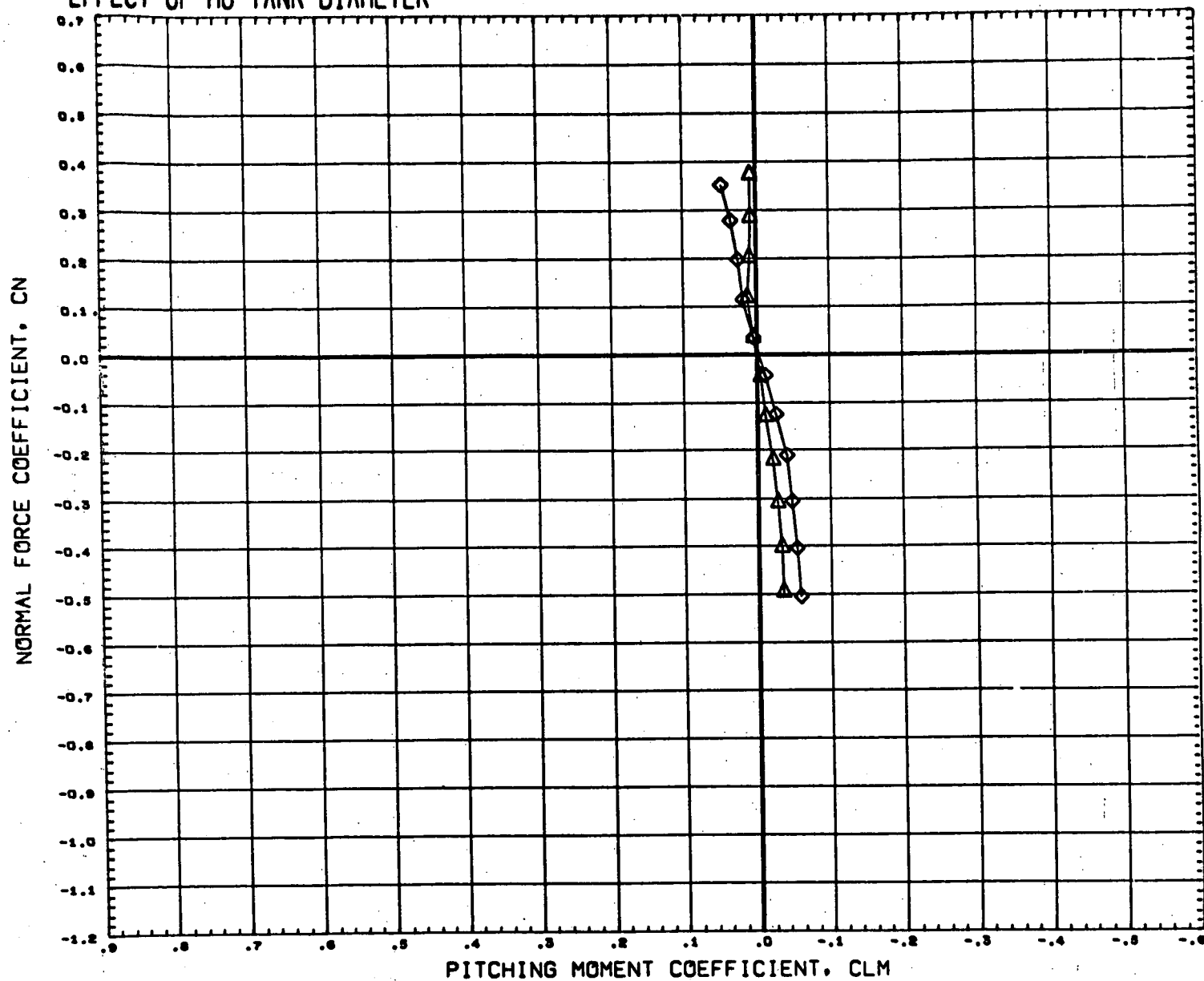
EFFECT OF H0 TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | YMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

EFFECT OF HO TANK DIAMETER



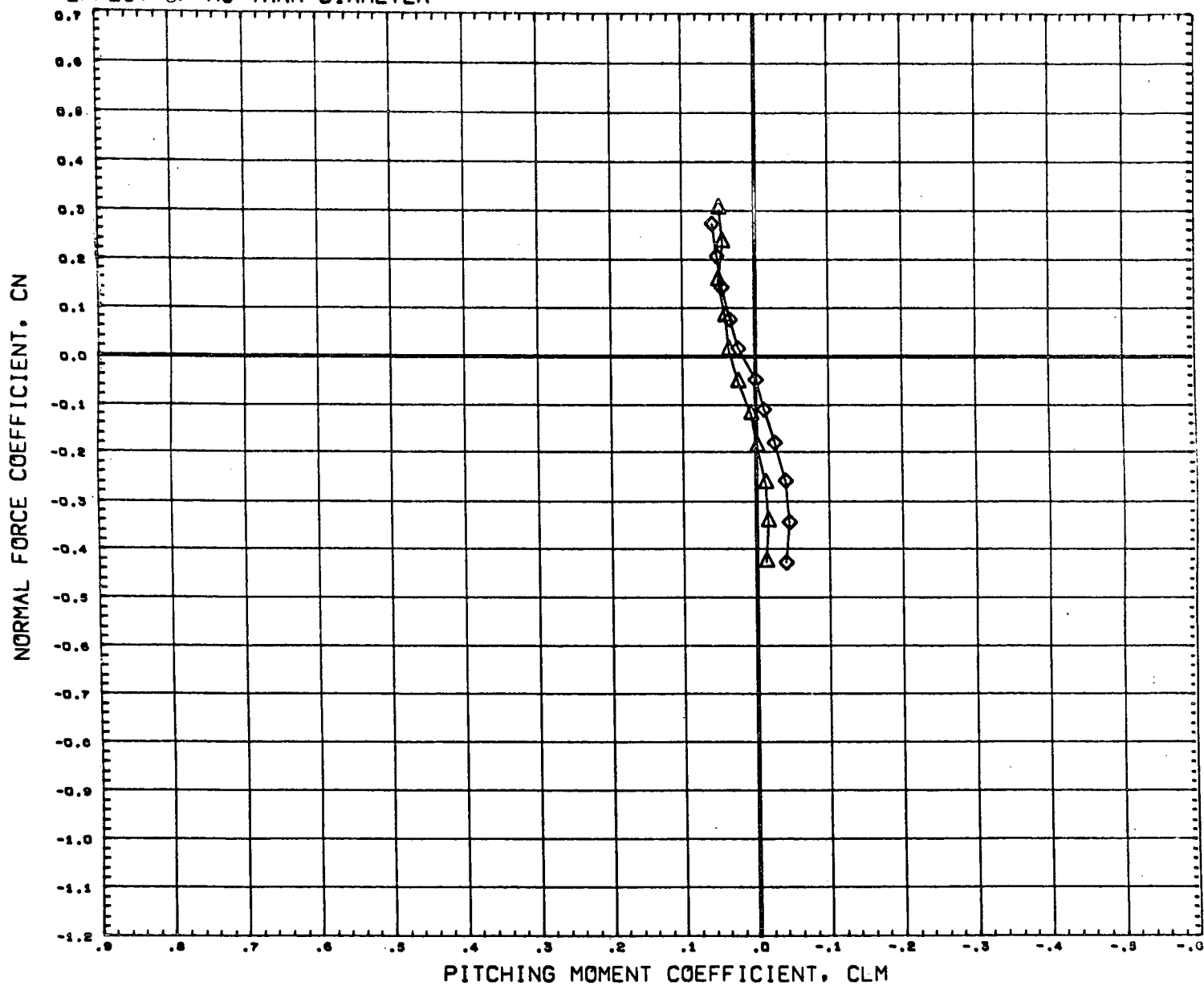
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6600 IN. |
| (B71091) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T30281 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (B71133) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T90281 | 0.000 | 0.023 | 0.000 | 0.000 | BREP | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XM RP | 3.3600 IN. |
| | | | | | | YM RP | 0.0000 IN. |
| | | | | | | ZM RP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

3.48

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EFFECT OF H₀ TANK DIAMETER

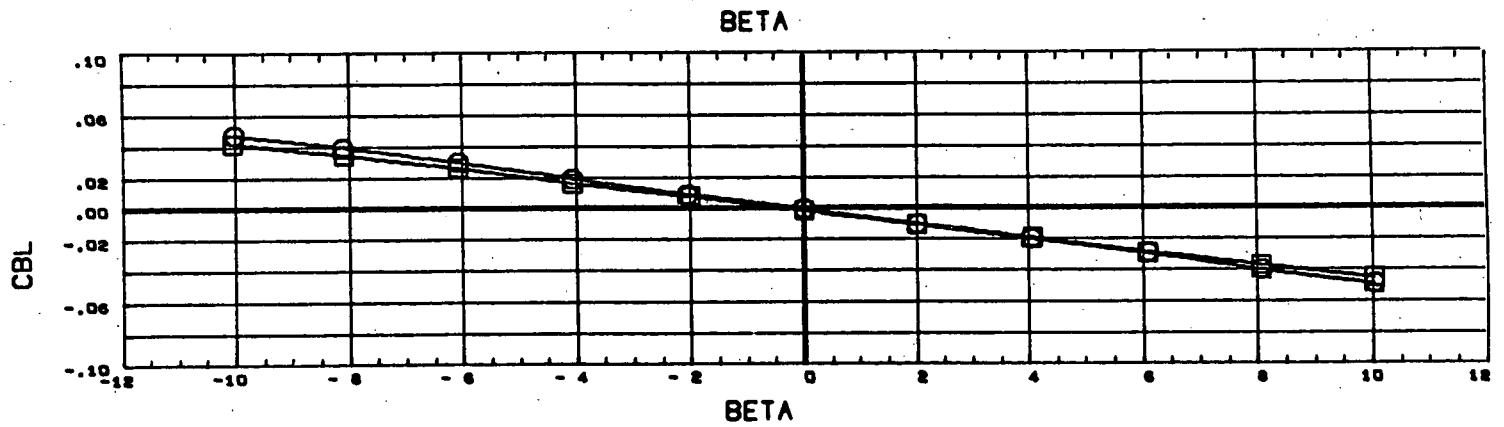
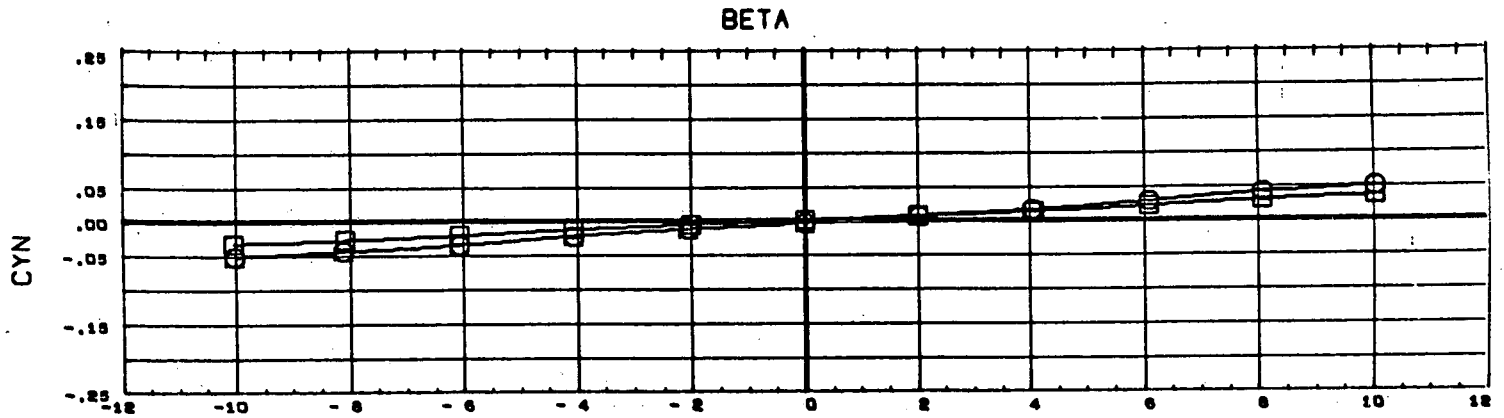
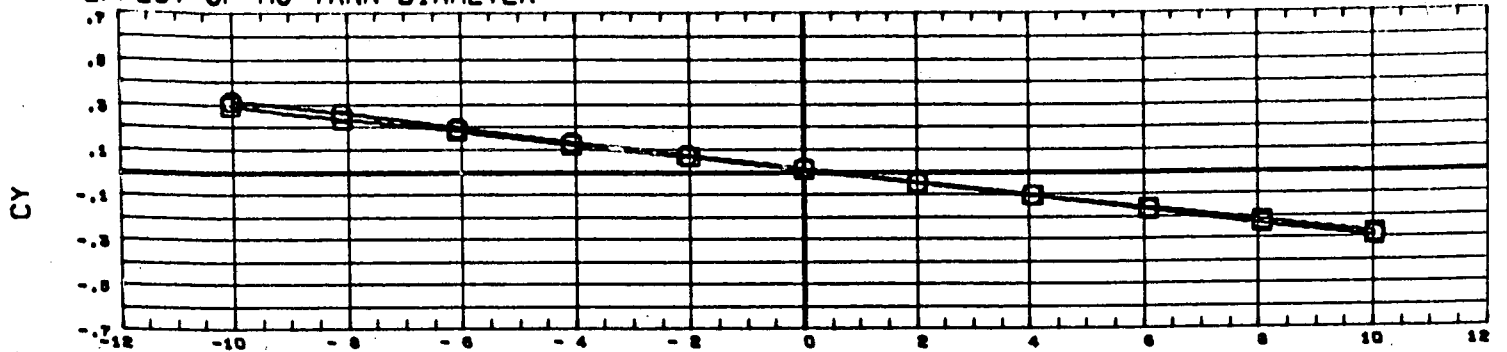


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF HO TANK DIAMETER



DATA SET: SYMBOL CONFIGURATION DESCRIPTION

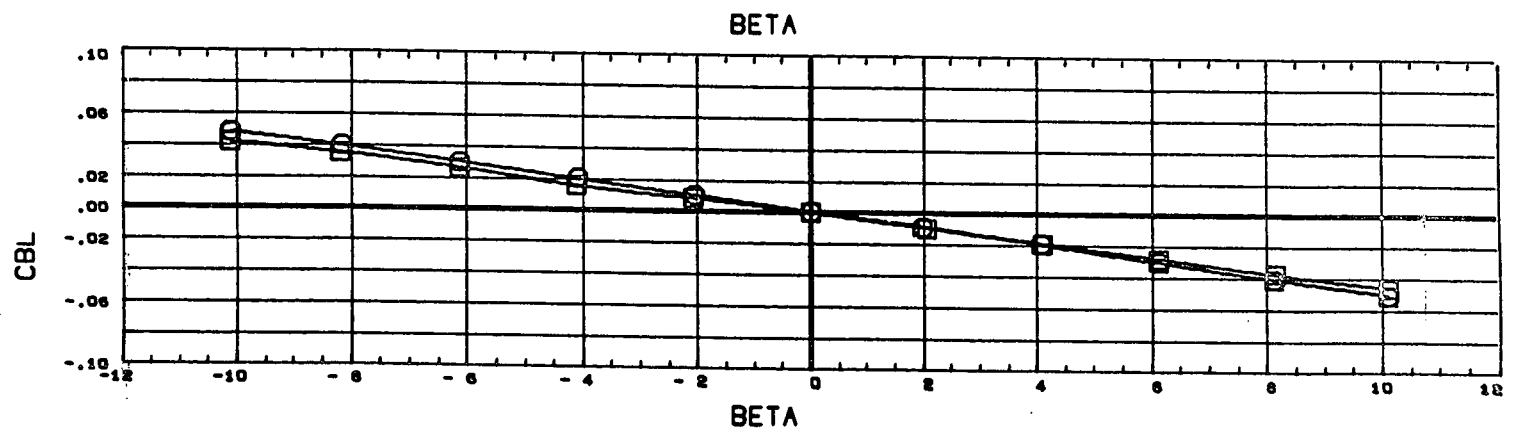
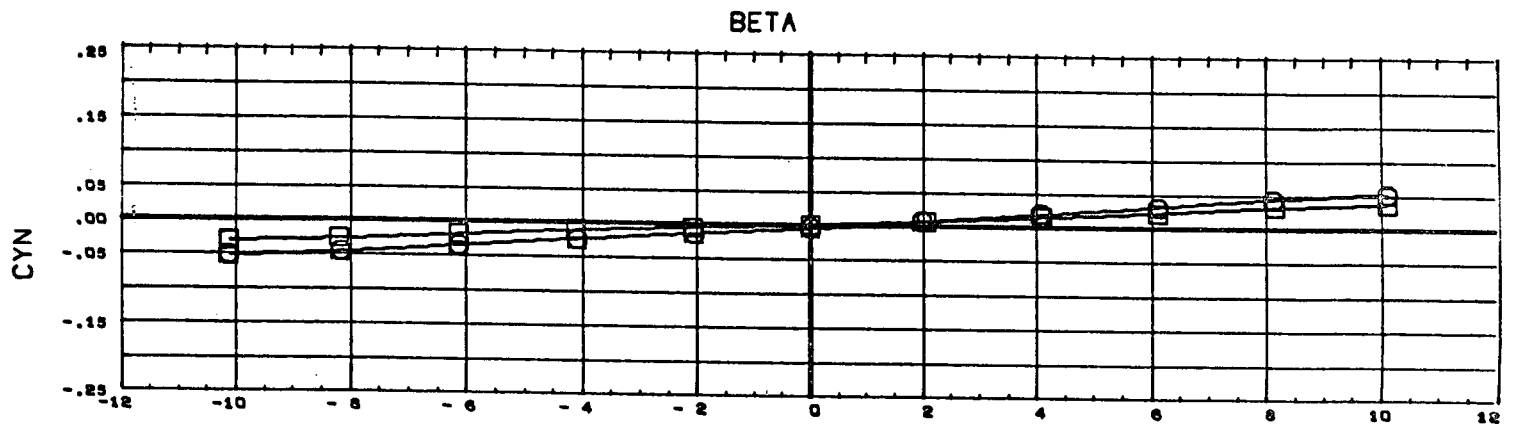
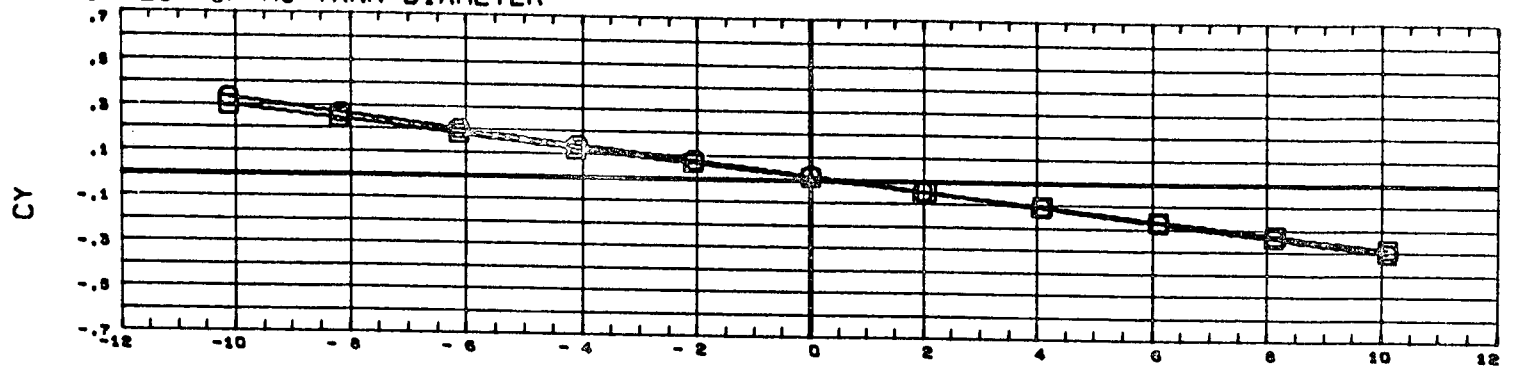
| | | |
|----------|---------------------------------------|--------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T90181 |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T90181 |

| ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 5q. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2460 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF HO TANK DIAMETER



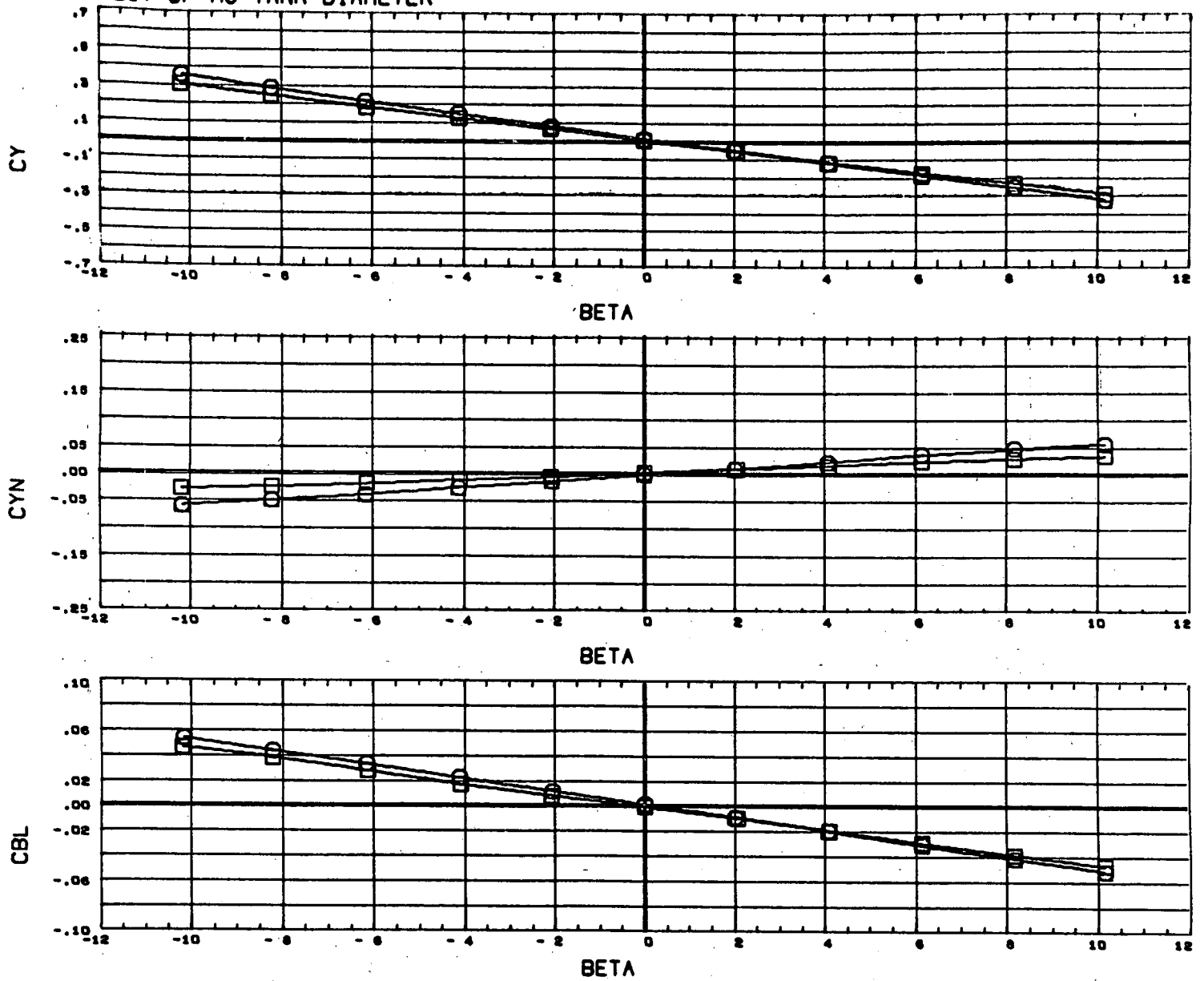
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 |

| ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION |
|--------|-------|--------|--------|-----------------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | XMRF 3.3600 IN. |
| | | | | YMRP 0.0000 IN. |
| | | | | ZMRP 0.2480 IN. |
| | | | | SCALE 0.0040 SCALE |

MACH .80

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EFFECT OF HO TANK DIAMETER

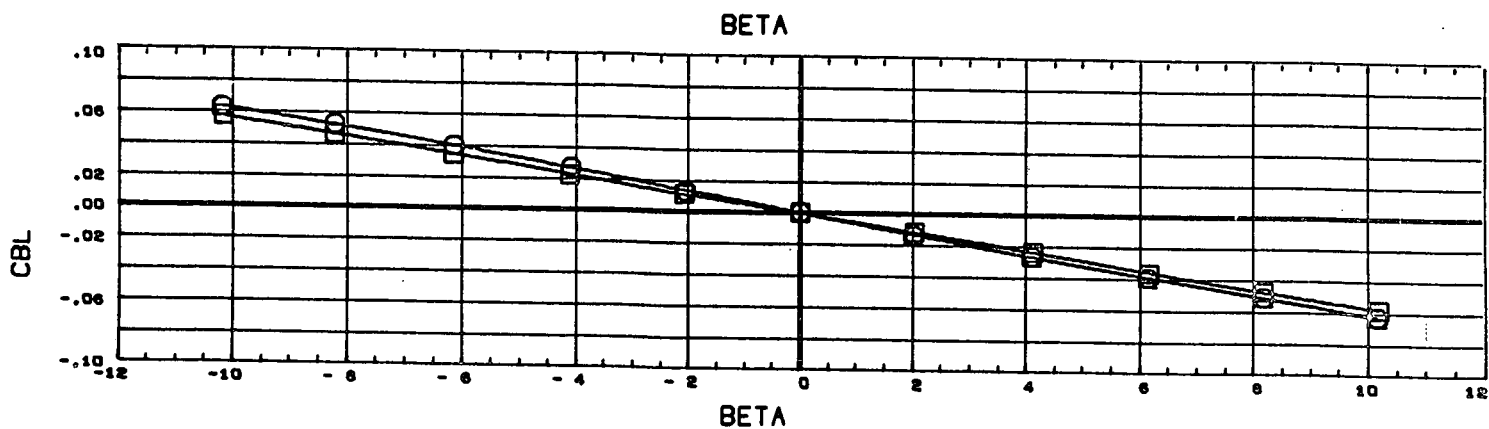
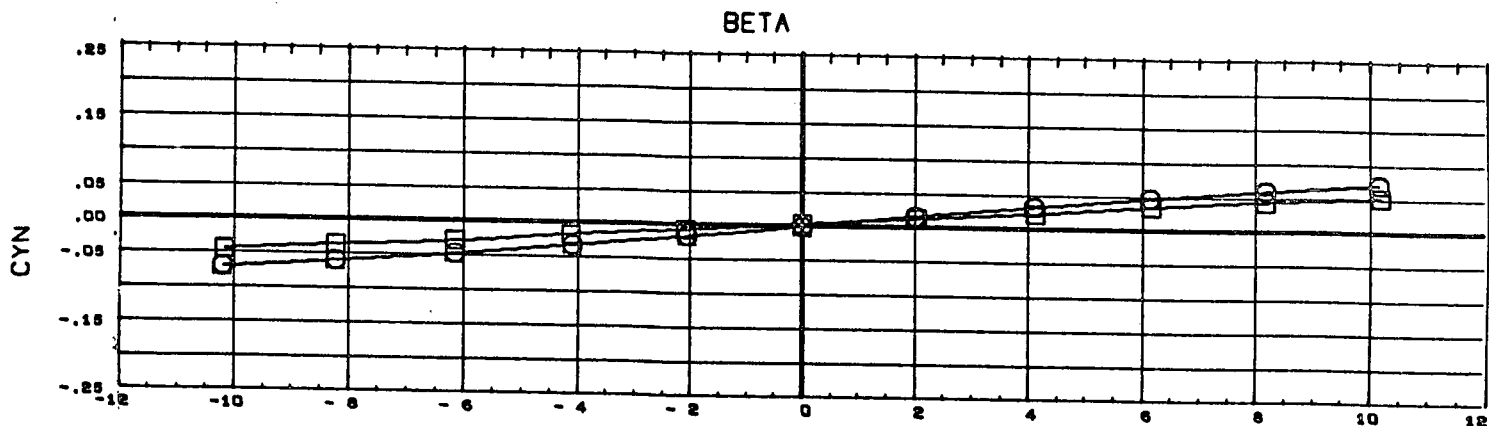
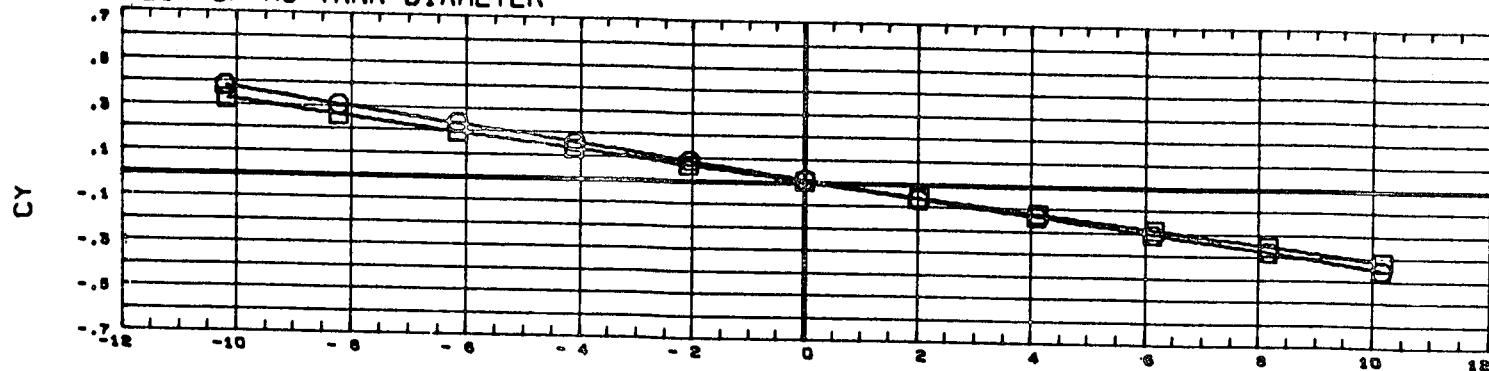


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF HO TANK DIAMETER

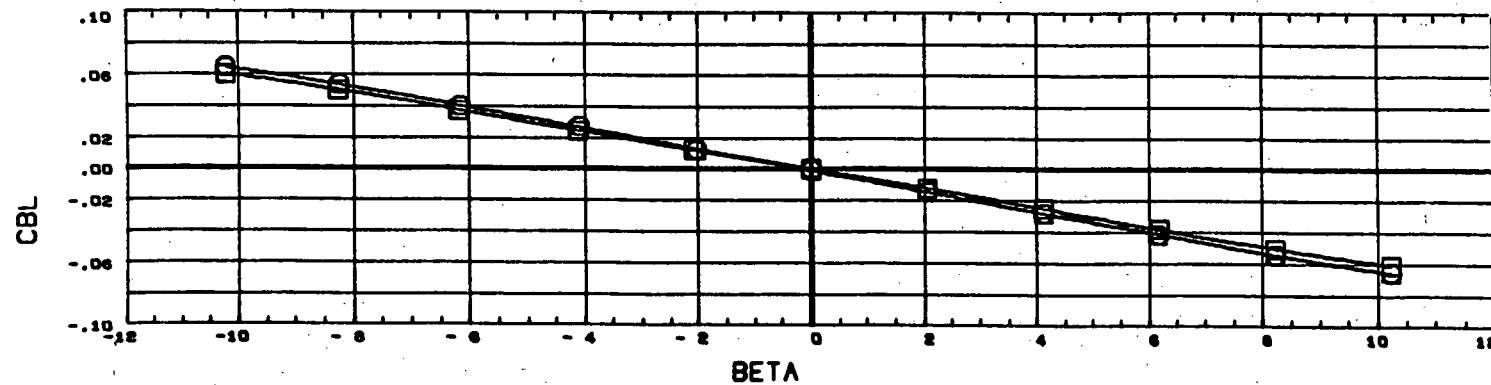
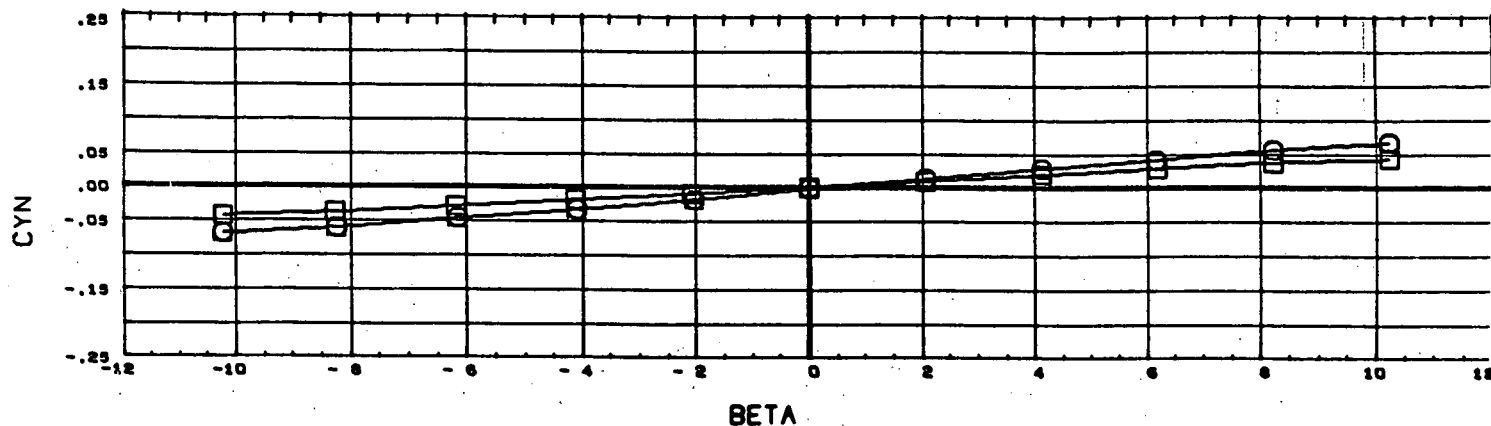
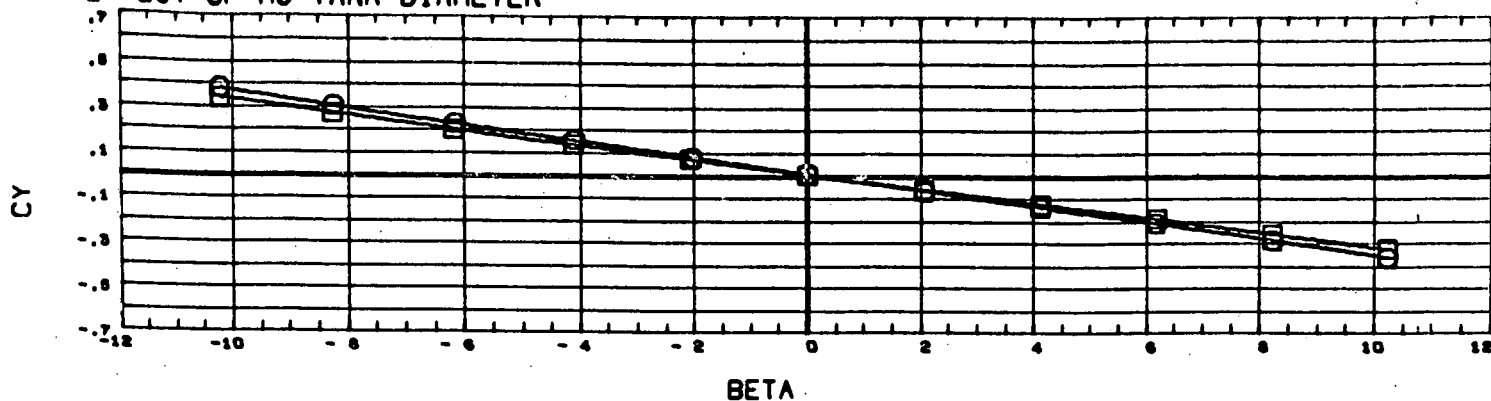


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH 1.00

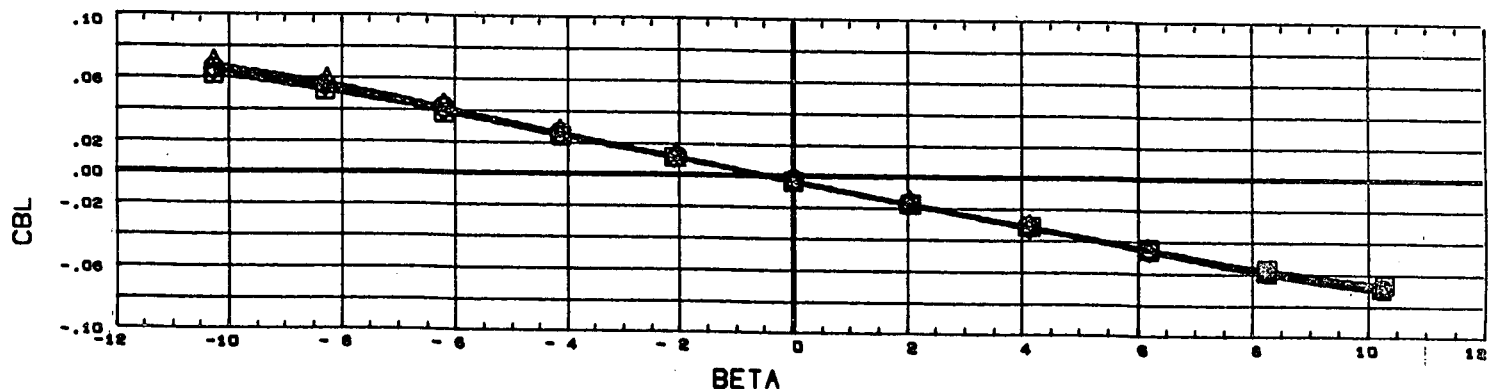
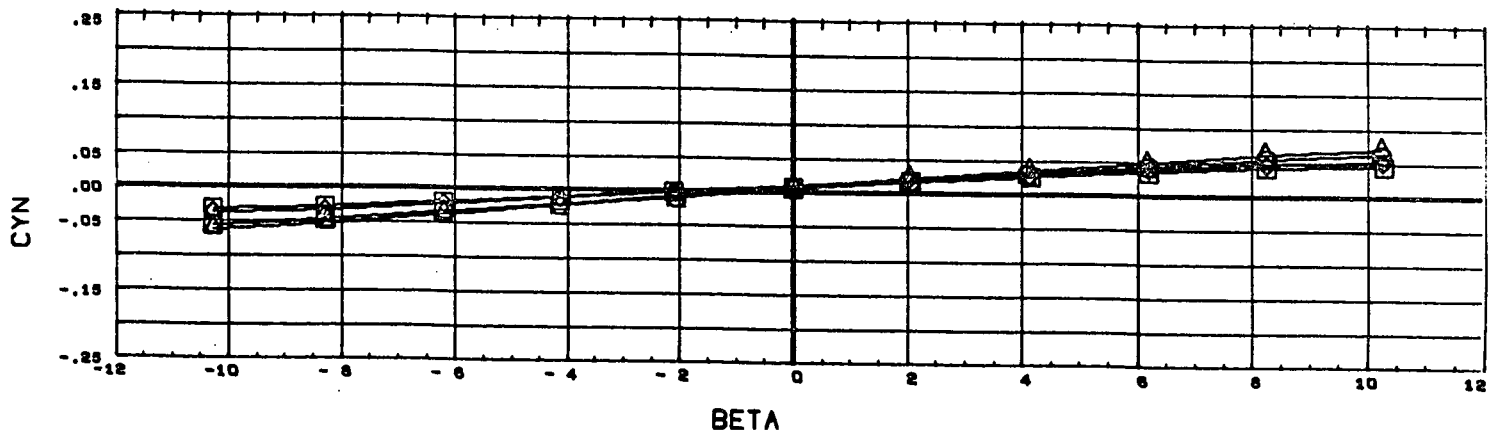
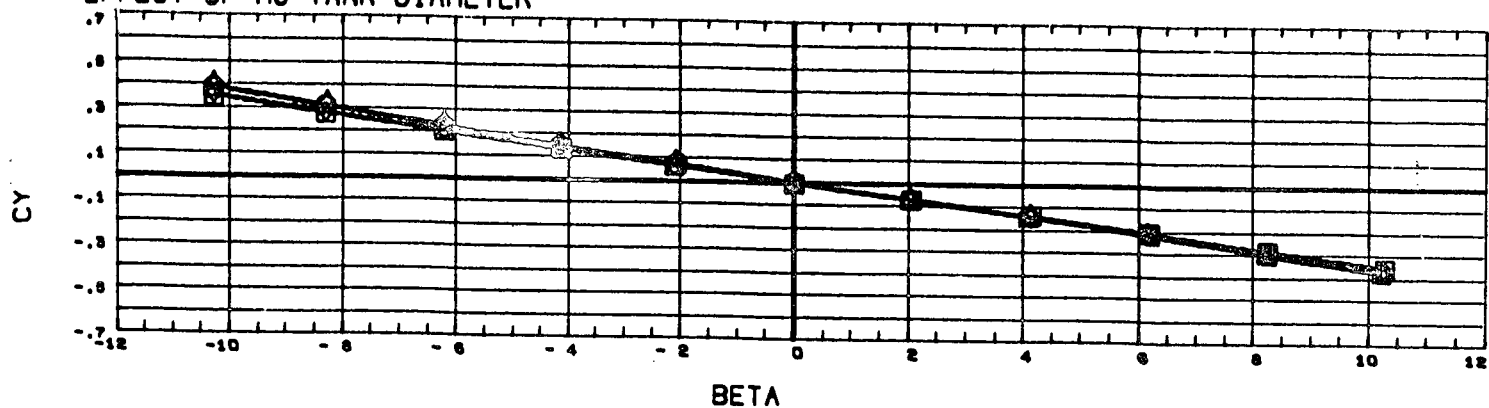
EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8600 80. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90181 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.8480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

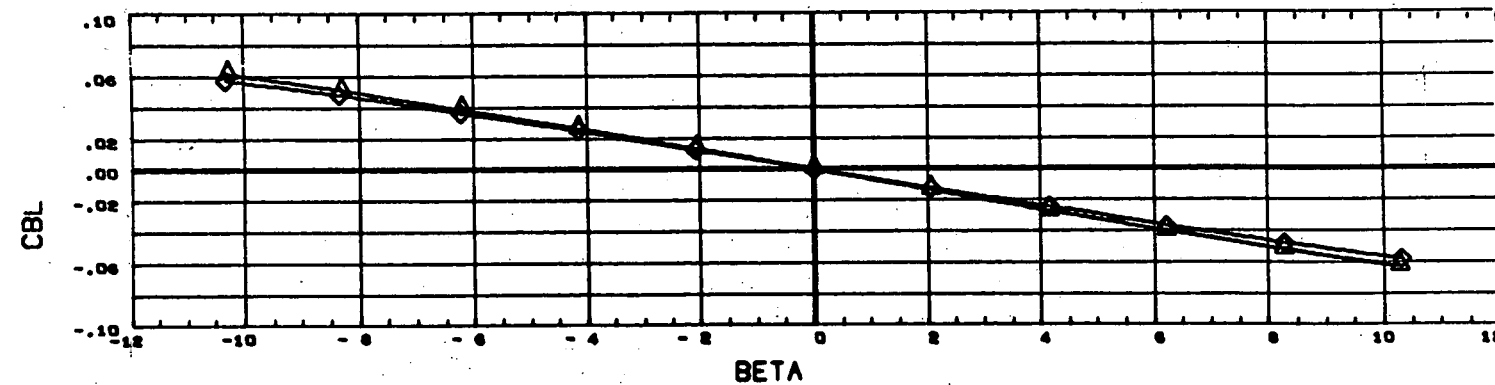
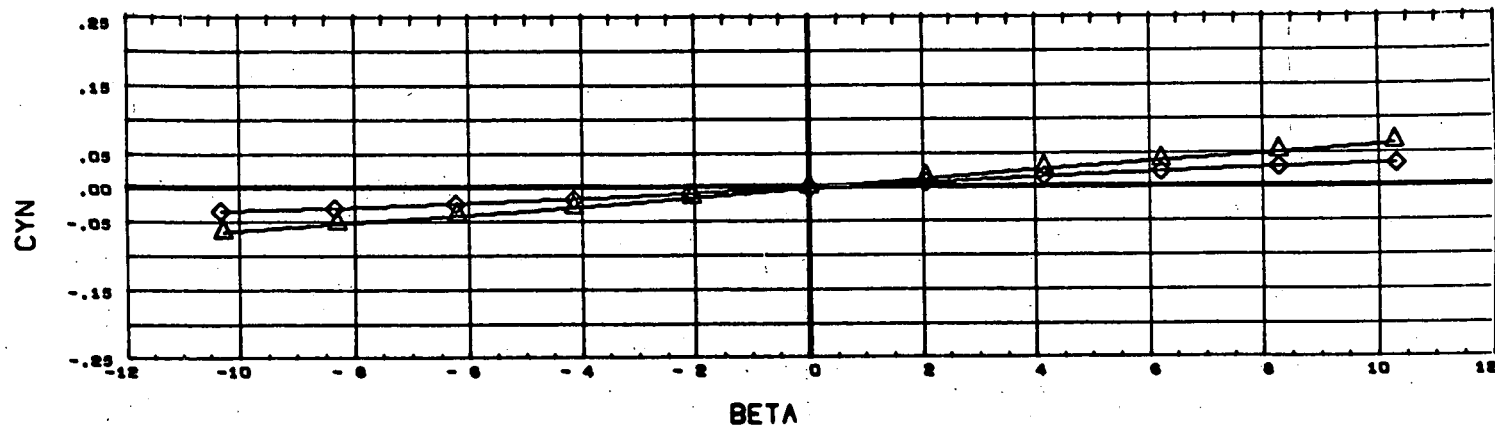
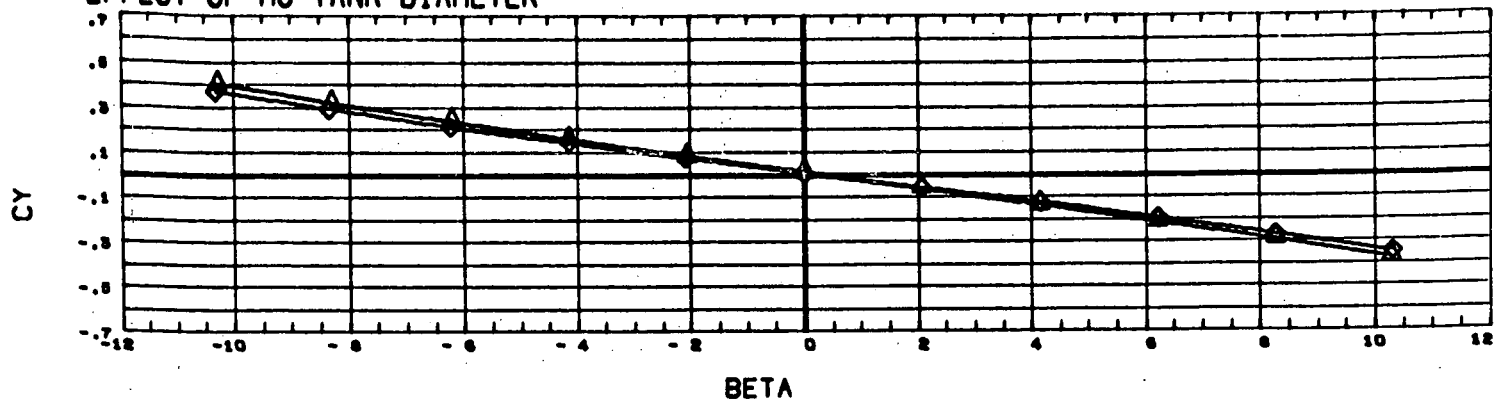
EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 | SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

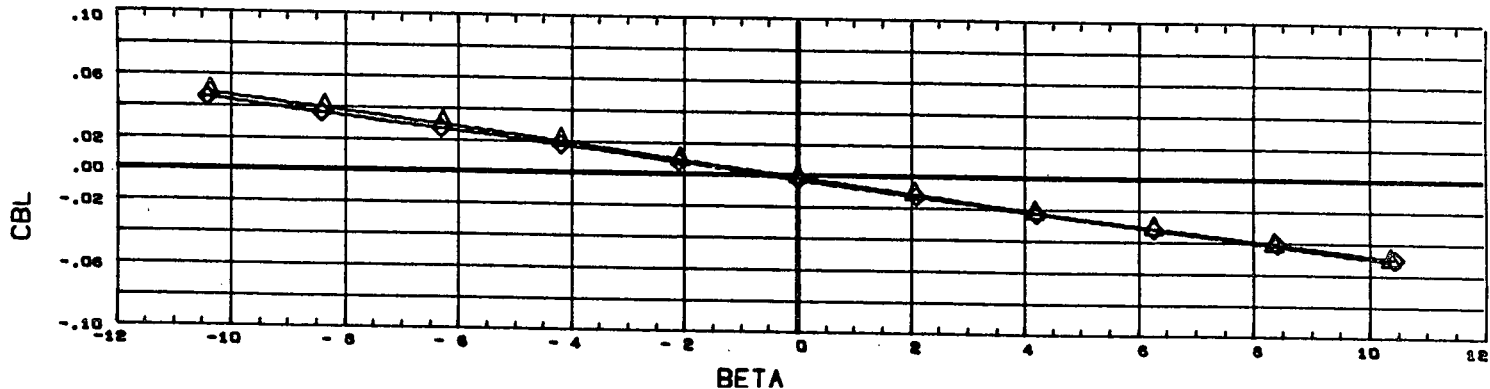
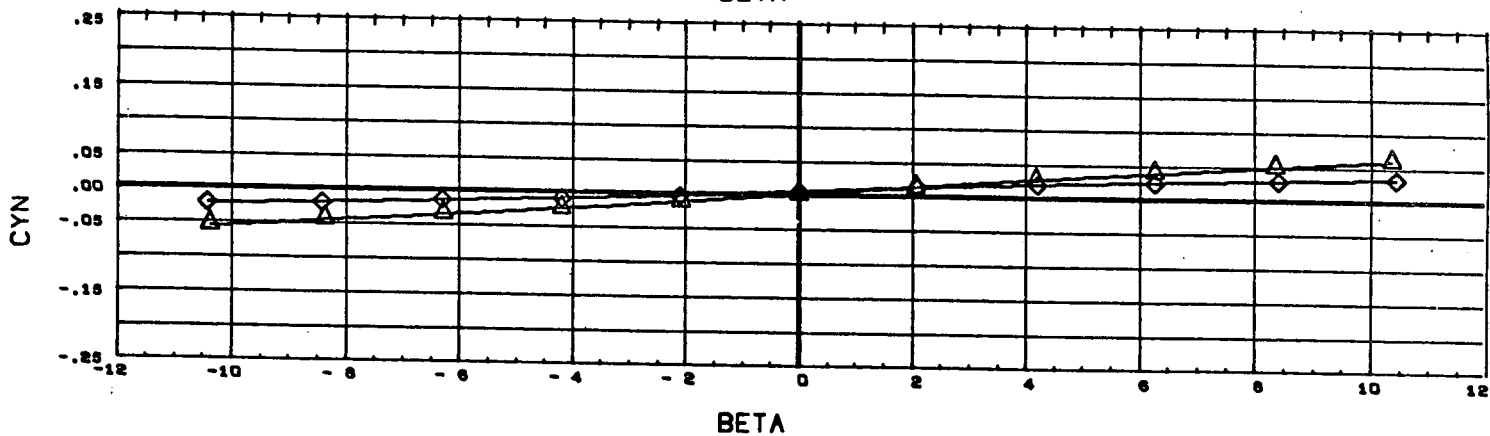
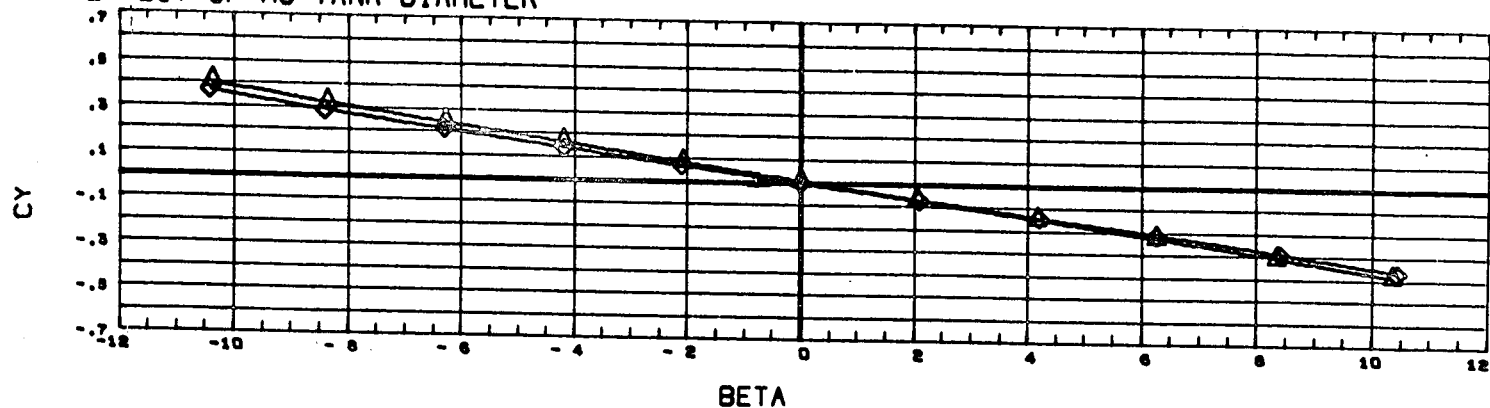
MACH 1.20

EFFECT OF HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF HO TANK DIAMETER

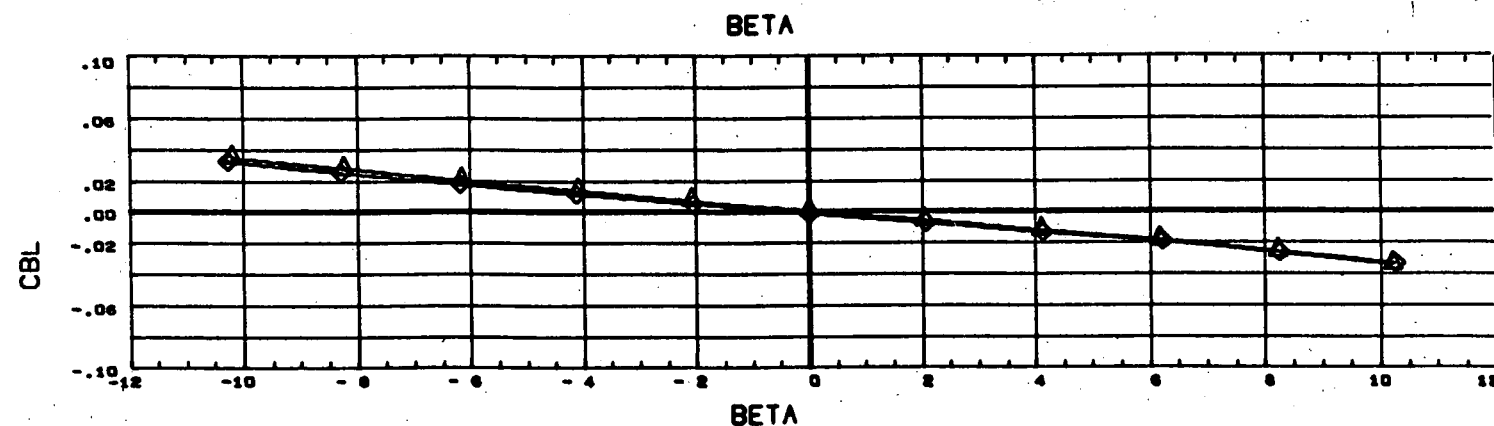
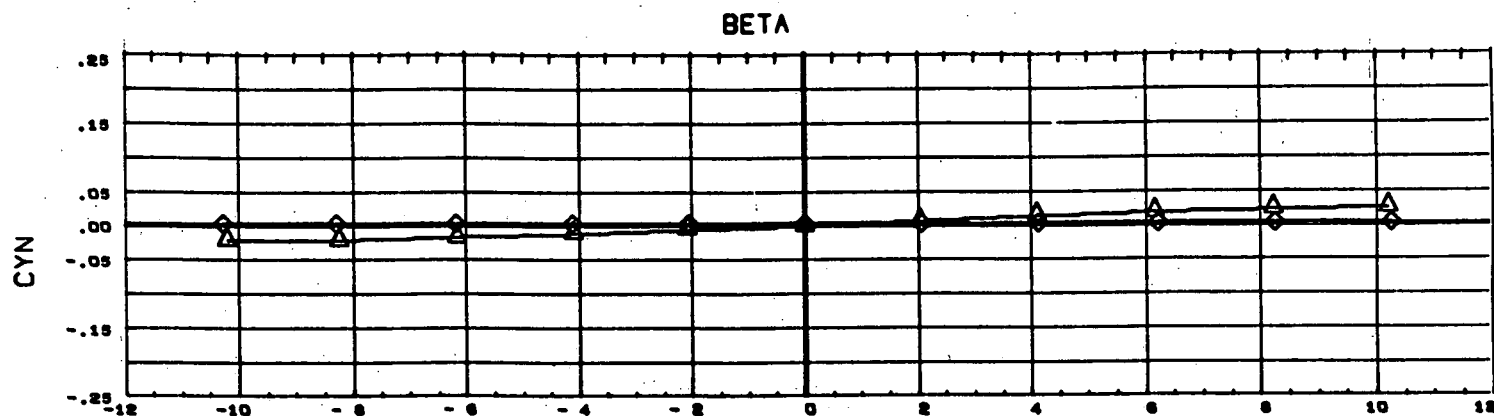
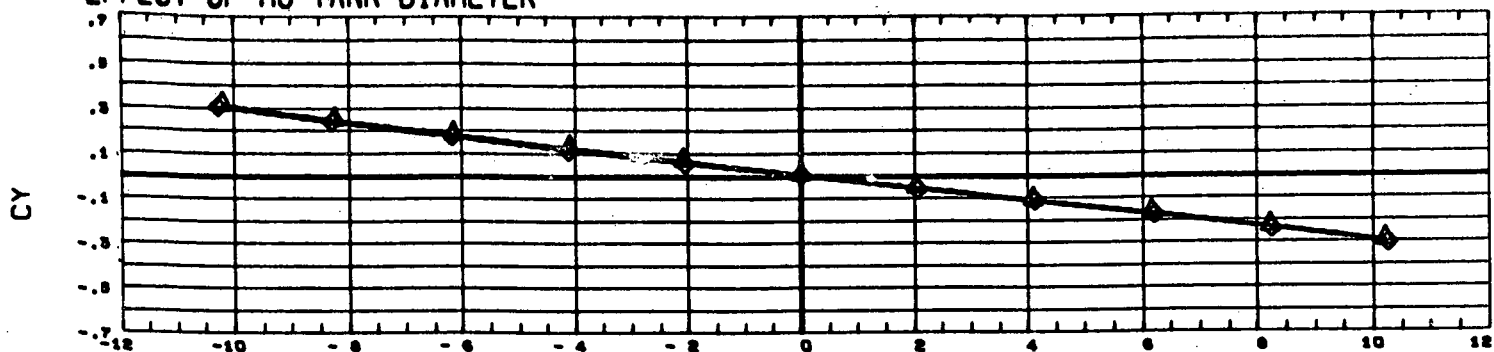


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS |

| ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION |
|--------|-------|--------|--------|-----------------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8600 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| | | | | YMRP 0.0000 IN. |
| | | | | ZMRP 0.2480 IN. |
| | | | | SCALE 0.0040 SCALE |

MACH 1.95

EFFECT OF HO TANK DIAMETER

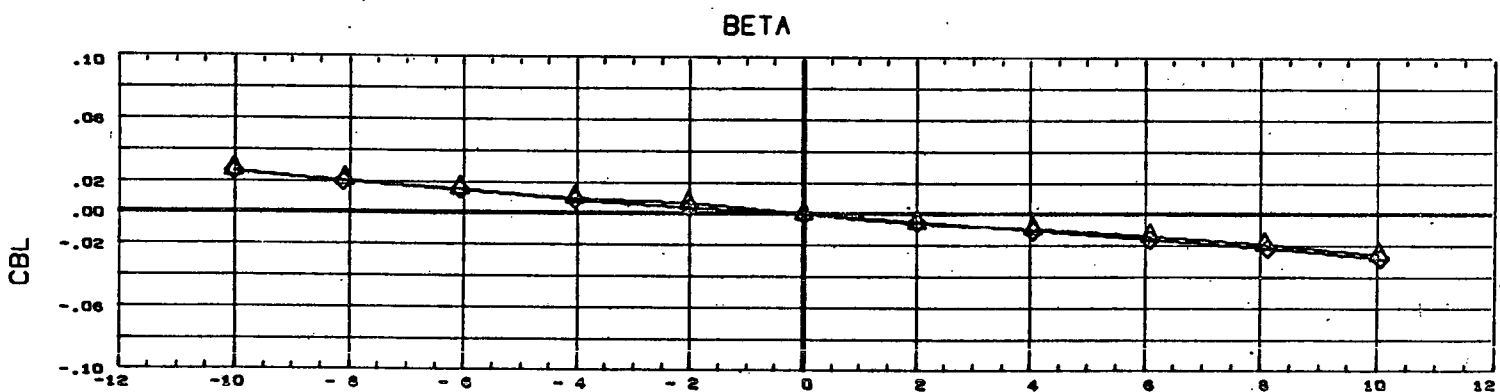
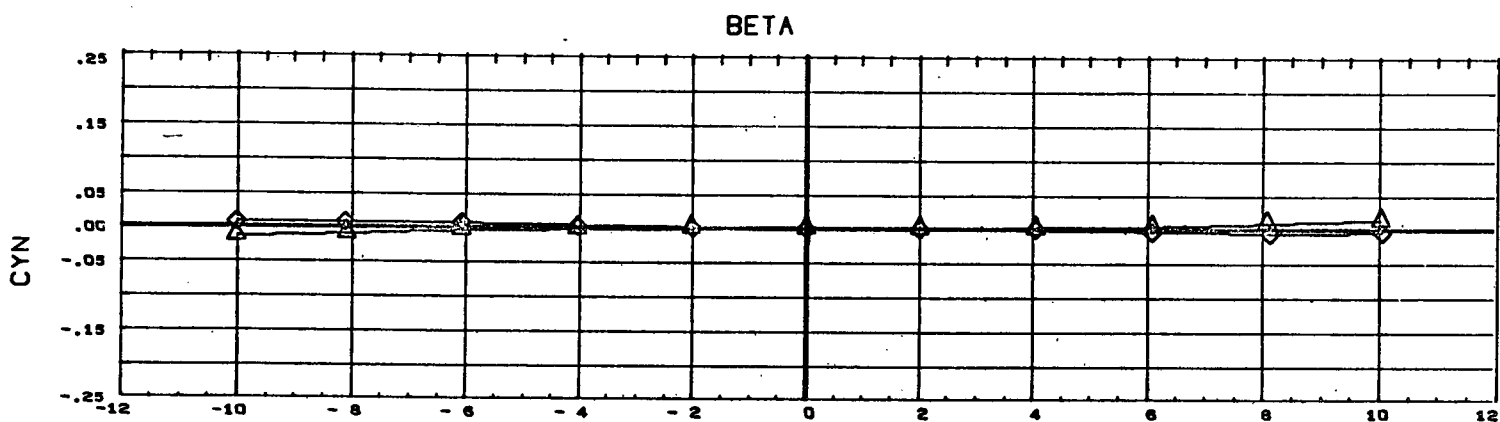
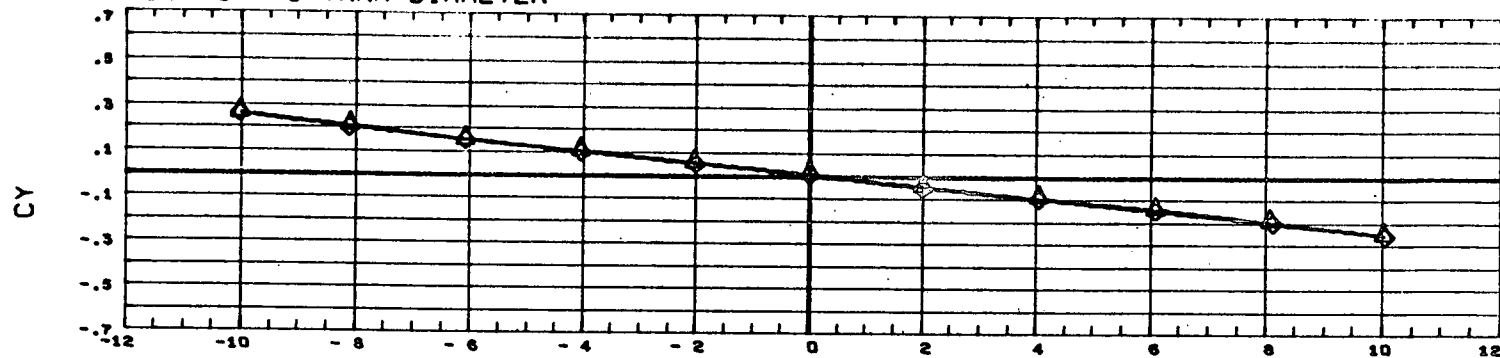


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4800 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF HO TANK DIAMETER



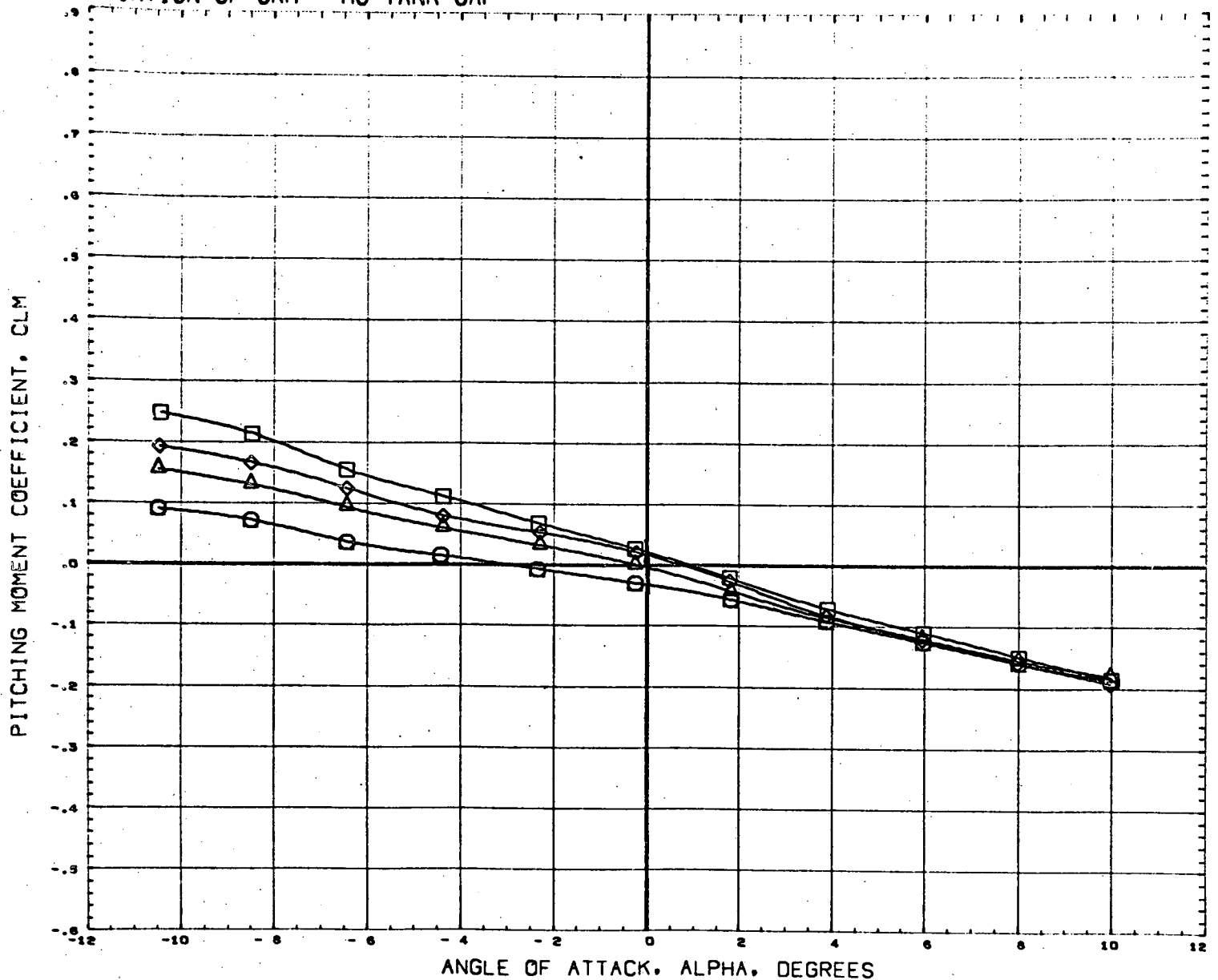
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MAÇH 4.96

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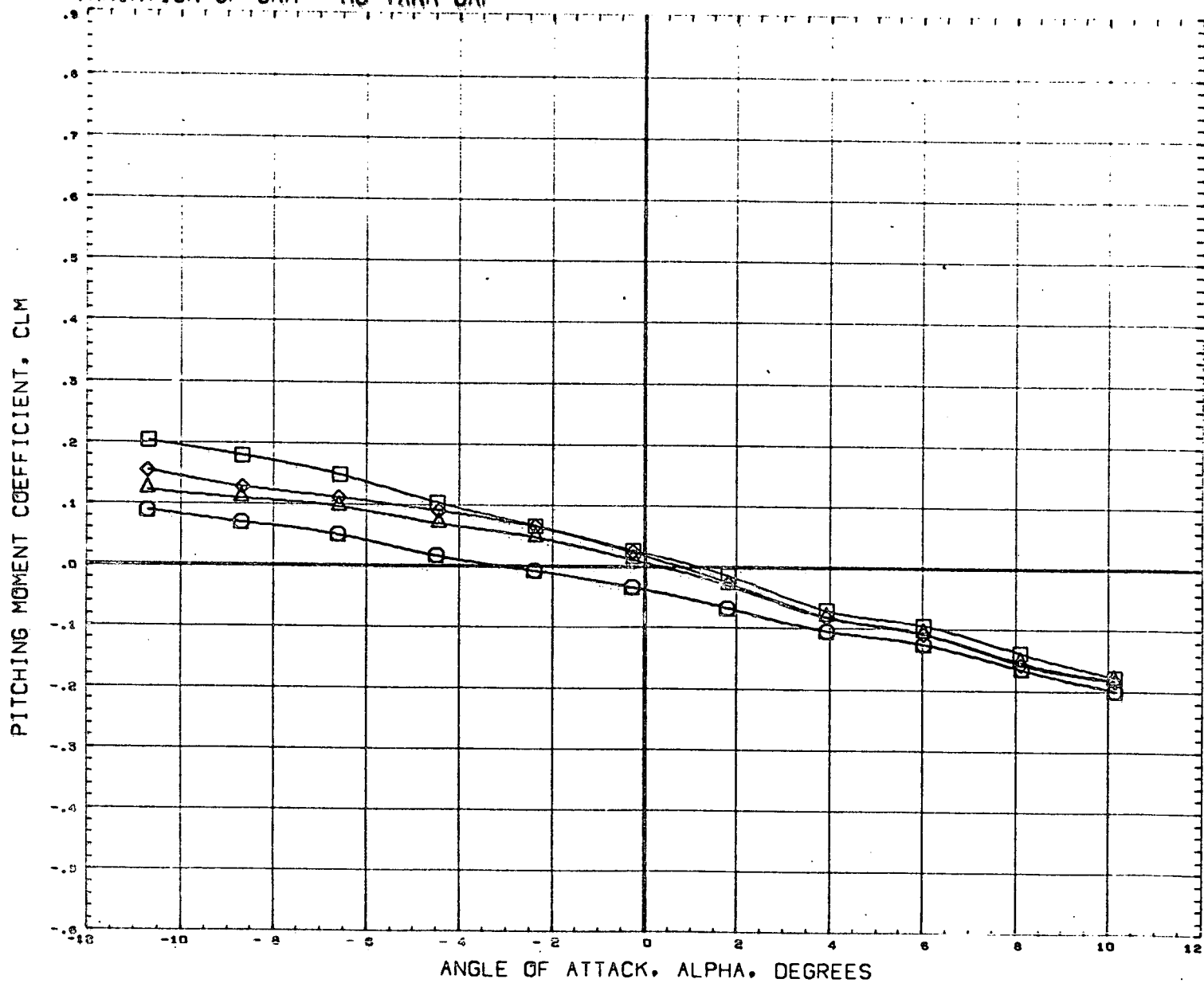
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

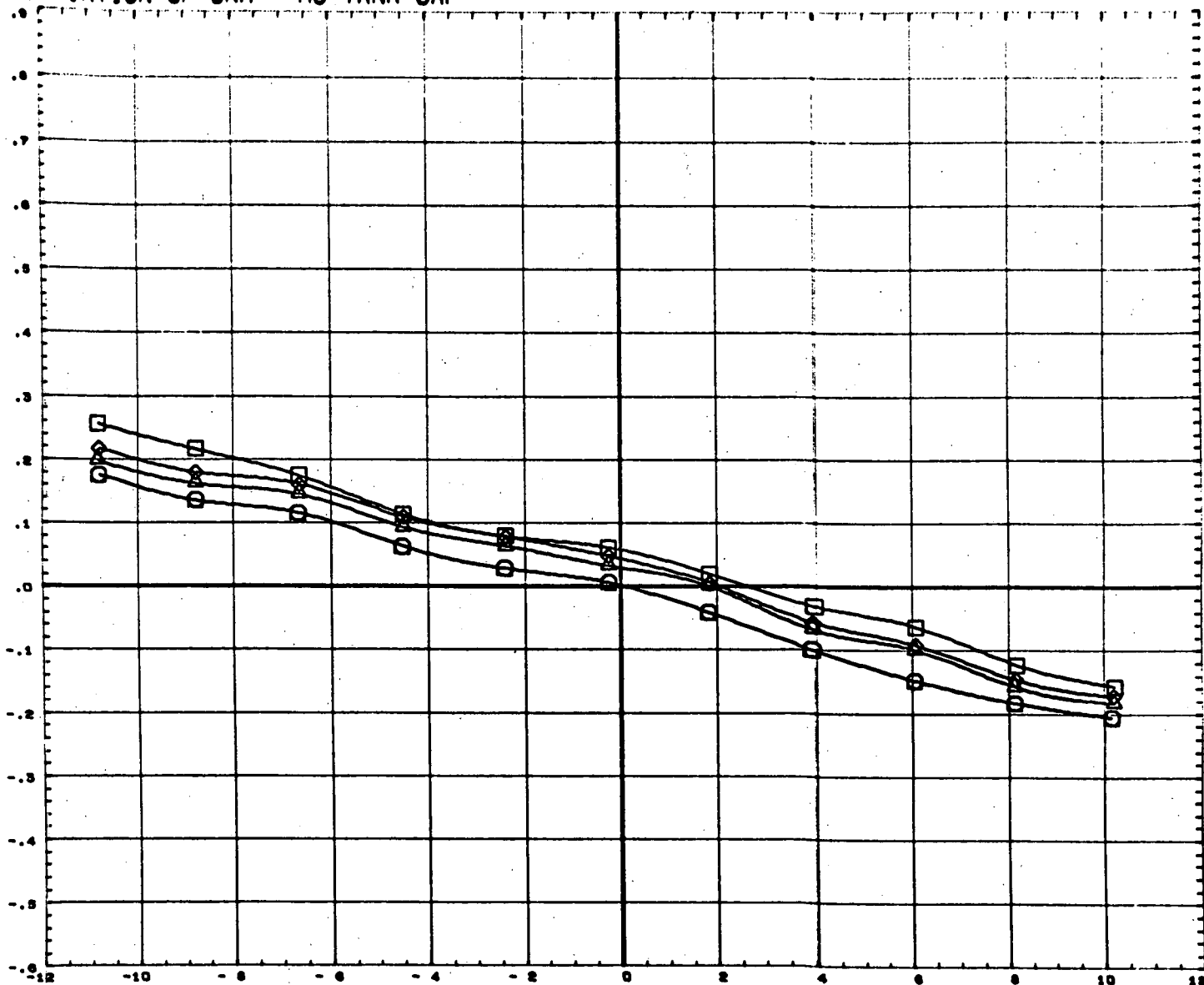
VARIATION OF SRM - HQ TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORIGIN | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0290 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | CRF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

VARIATION OF SRM - HO TANK GAP

PITCHING MOMENT COEFFICIENT, CLM



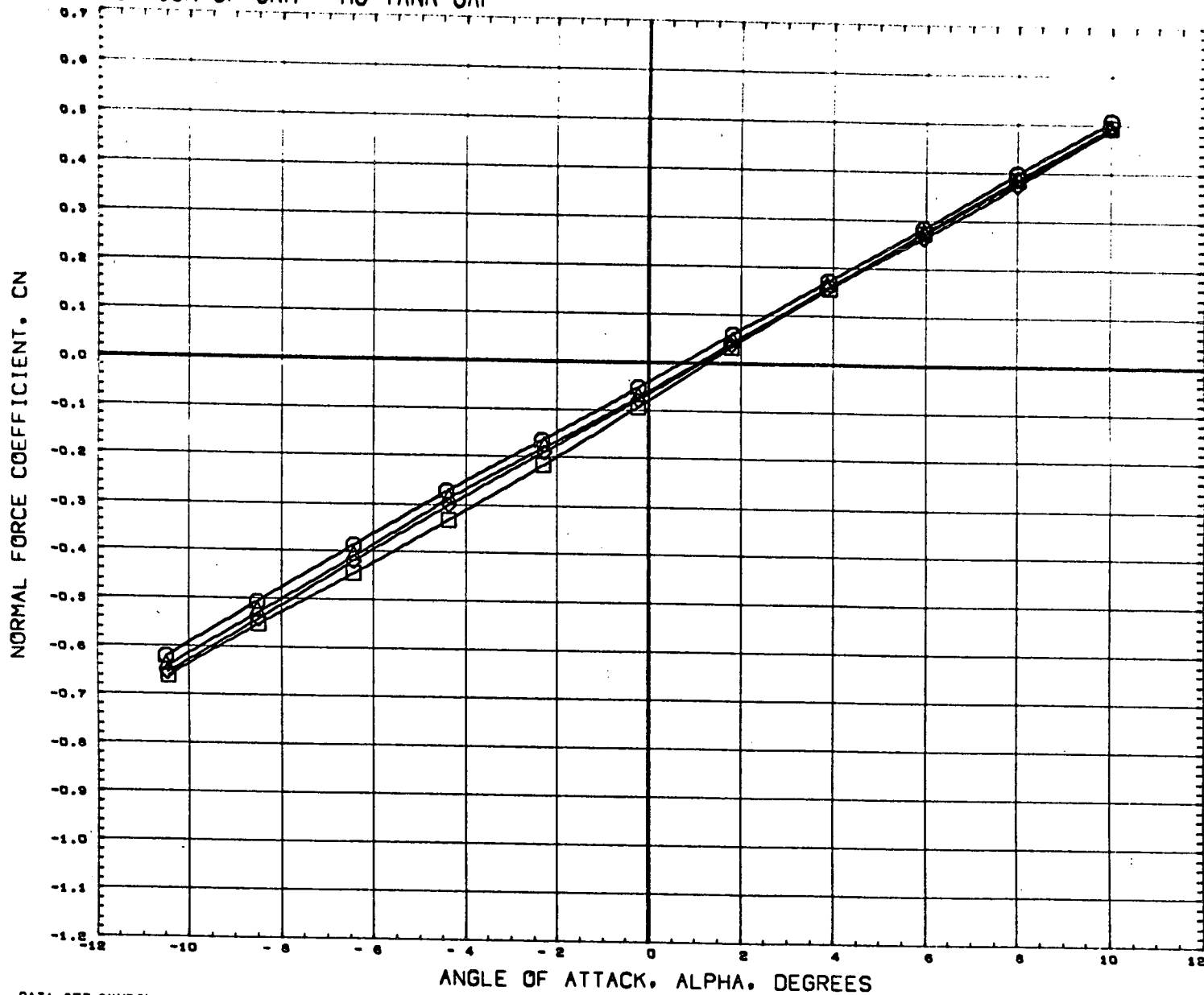
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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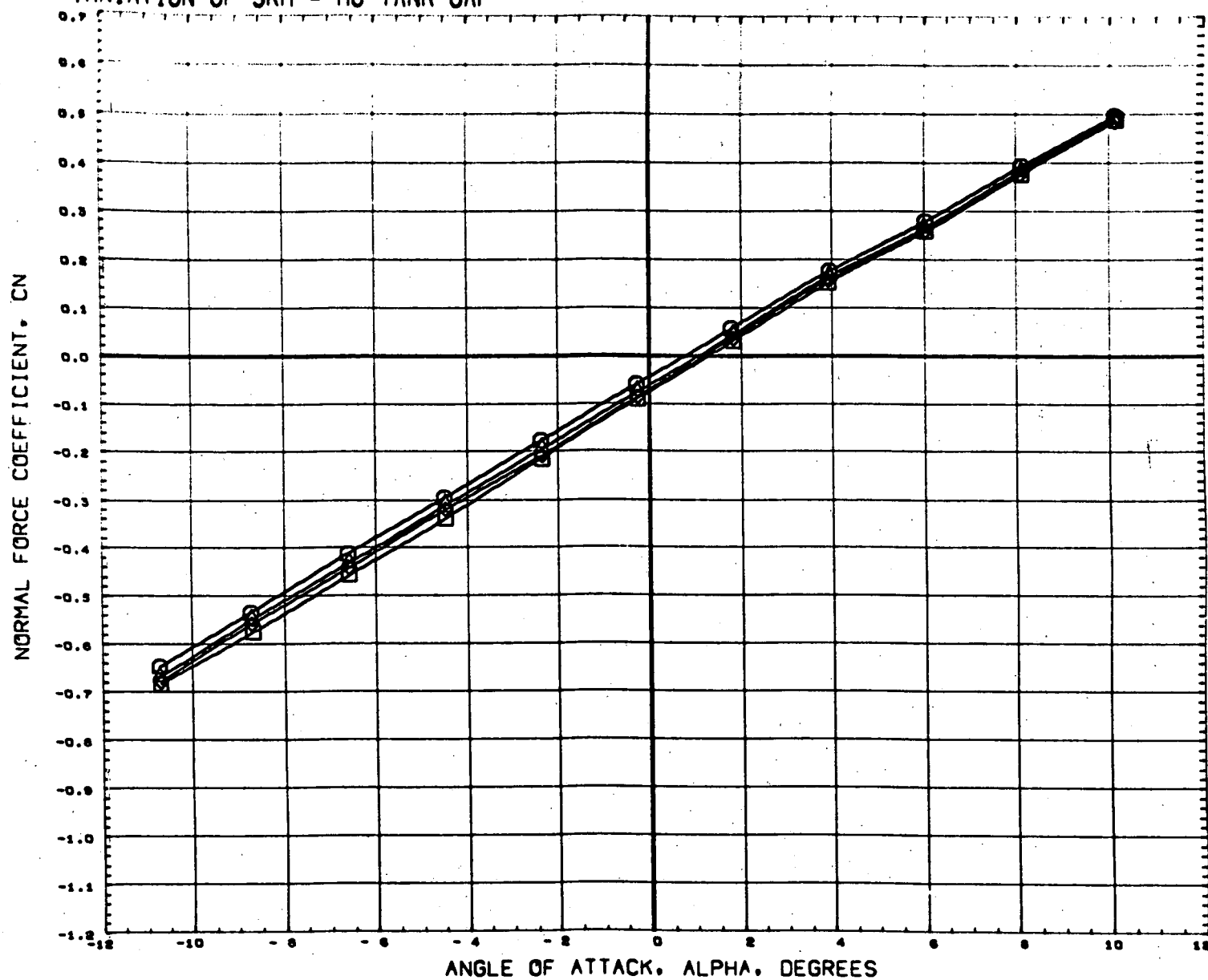
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

VARIATION OF SRM - HO TANK GAP



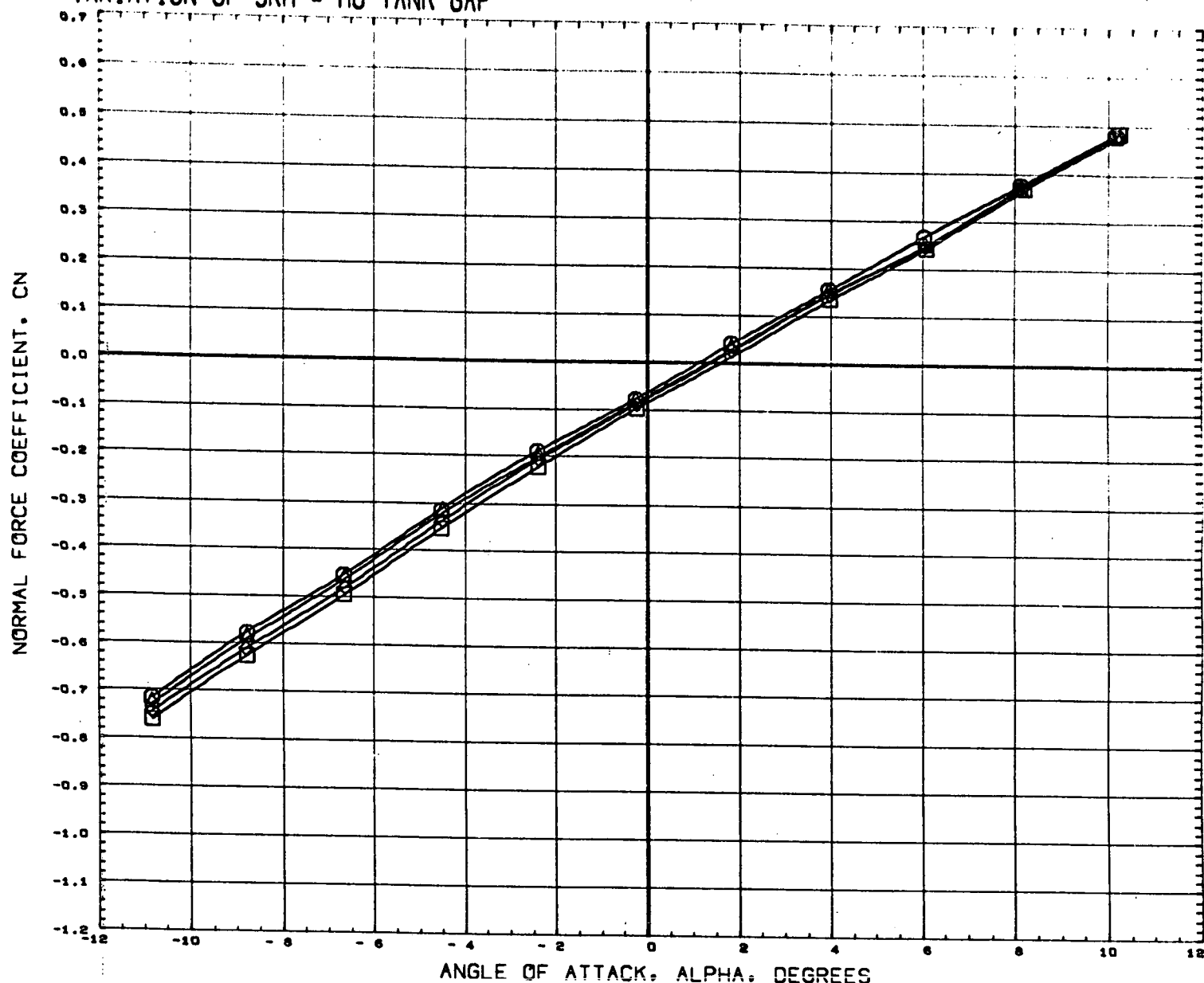
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XNRP | 3.3600 IN. |
| | | | | | | YNRP | 0.0000 IN. |
| | | | | | | ZNRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.80

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VARIATION OF SRM - HO TANK GAP

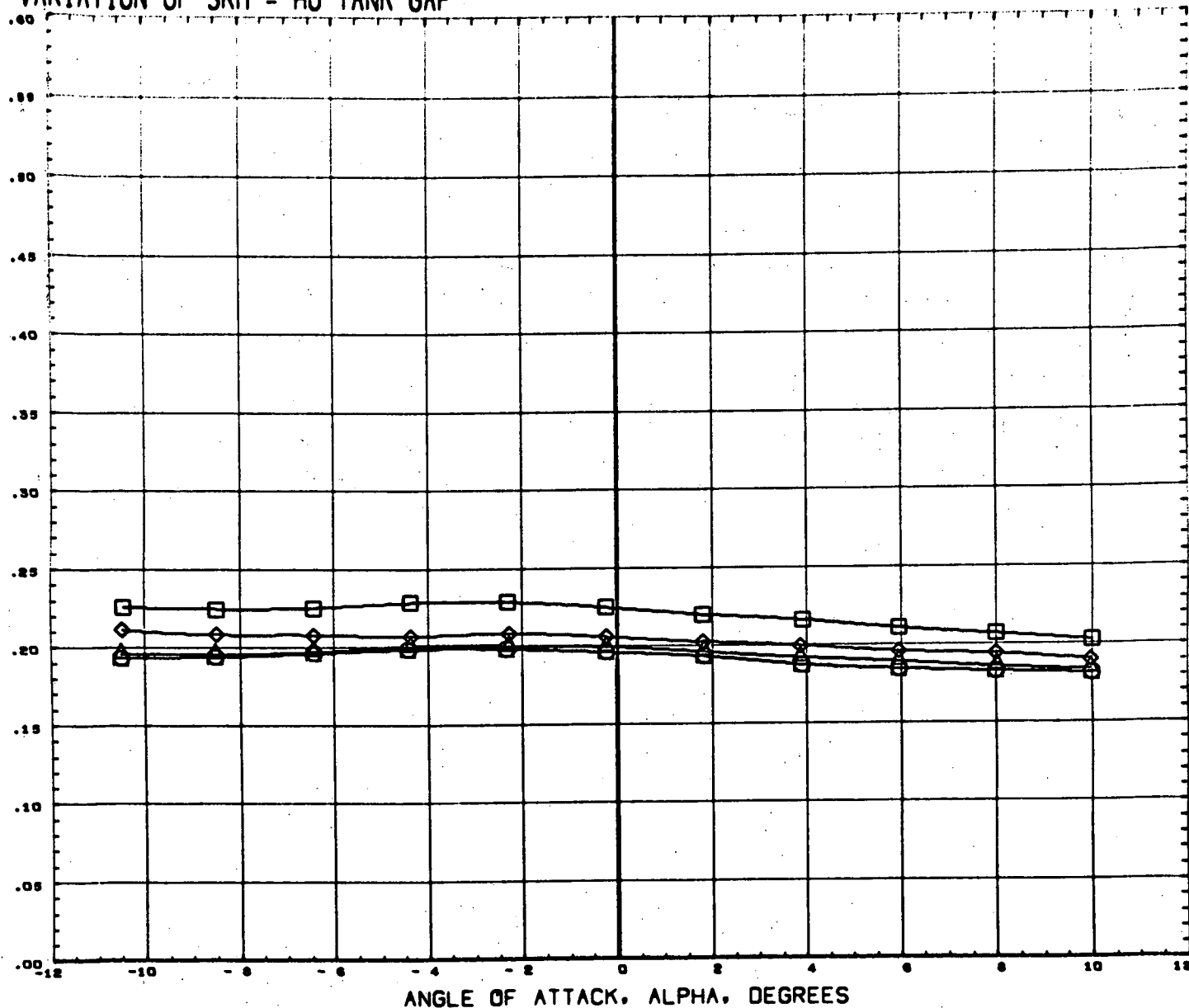


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

VARIATION OF SRM - HO TANK GAP

AXIAL FORCE COEFFICIENT, CA



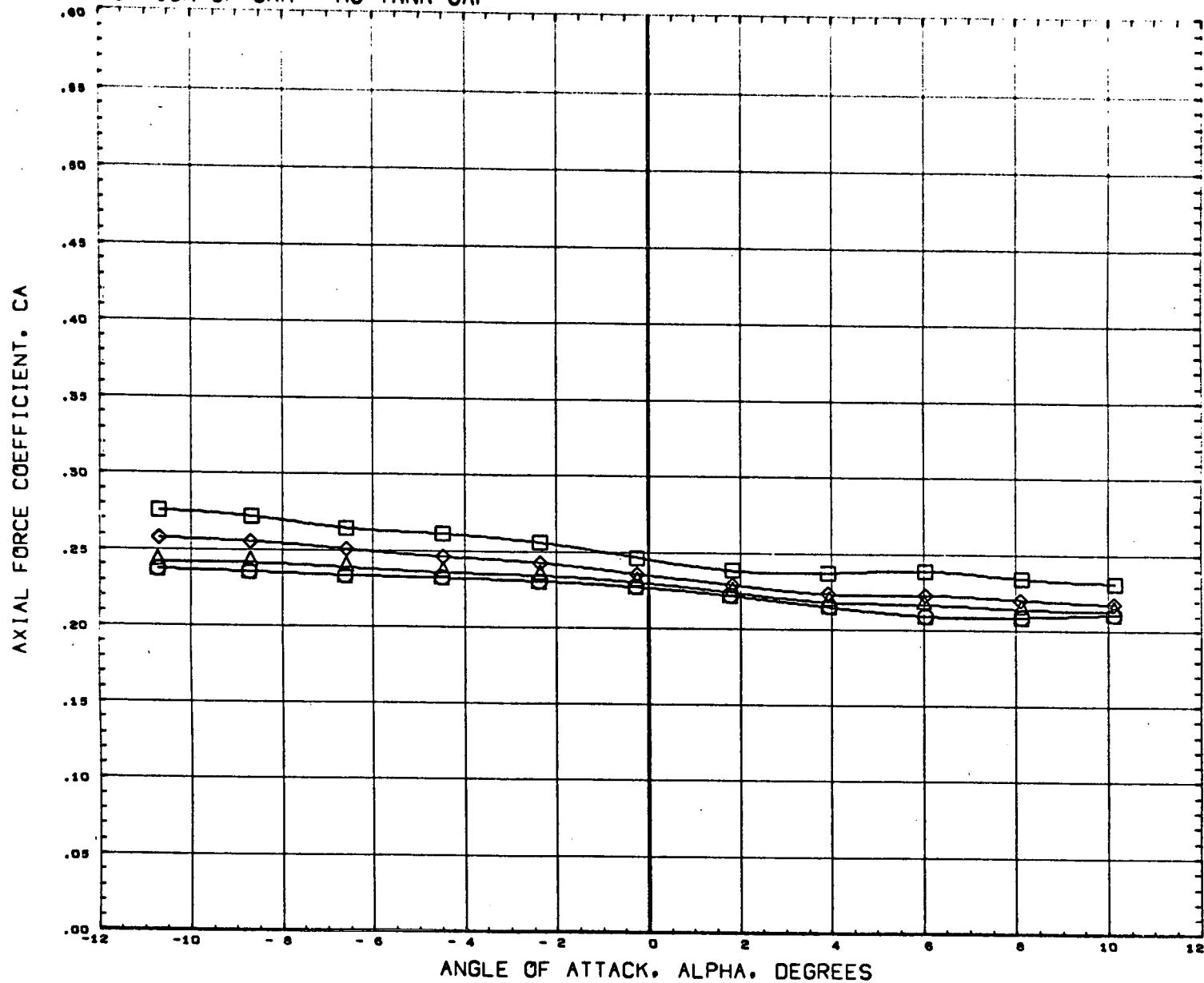
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (B71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.60

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VARIATION OF SRM - HO TANK GAP

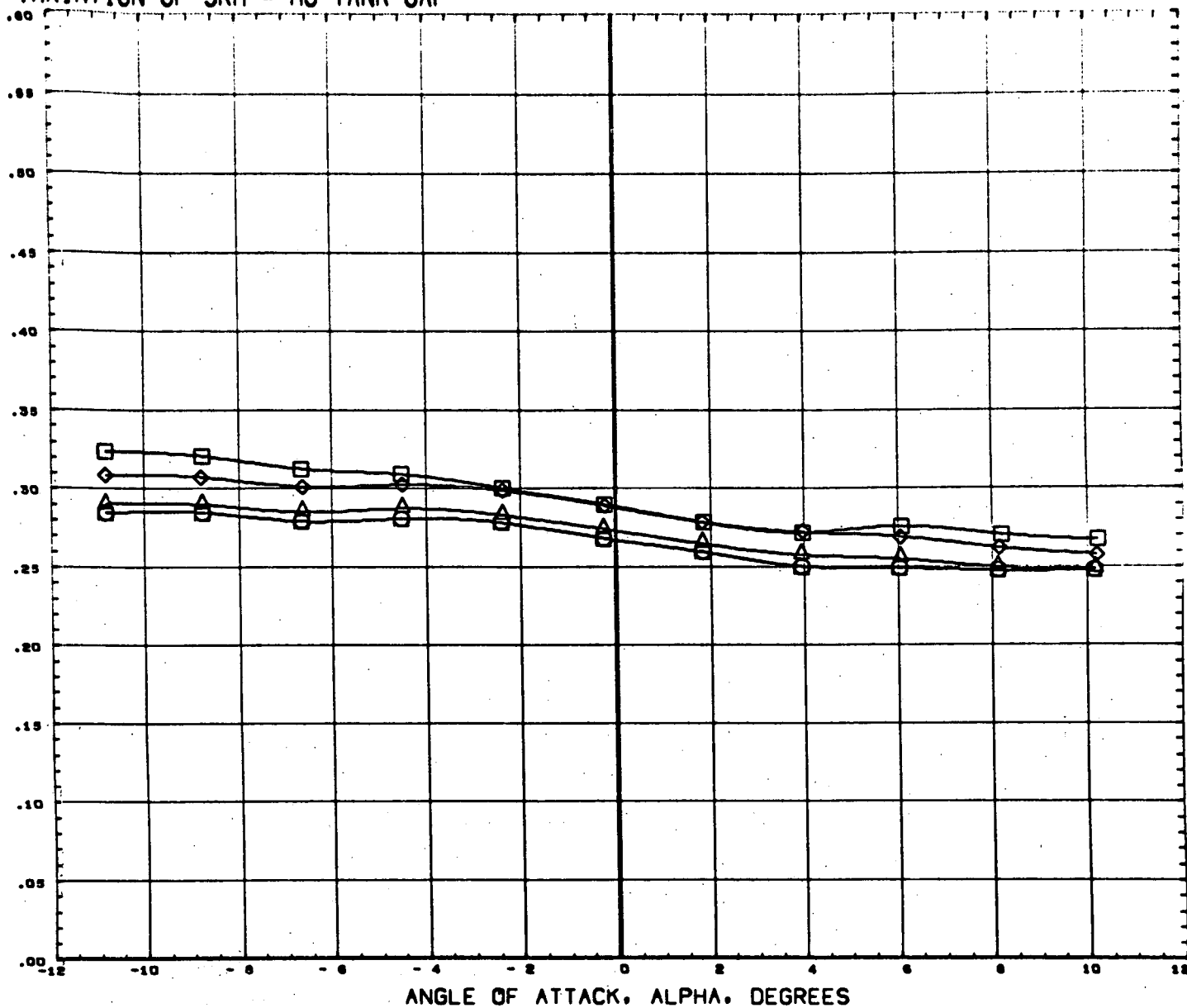


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T3O1S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T3O1S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T3O1S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T3O1S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3800 IN. |
| | | | | | | YMRP | 0.0090 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

VARIATION OF SRM - H0 TANK GAP

AXIAL FORCE COEFFICIENT, CA

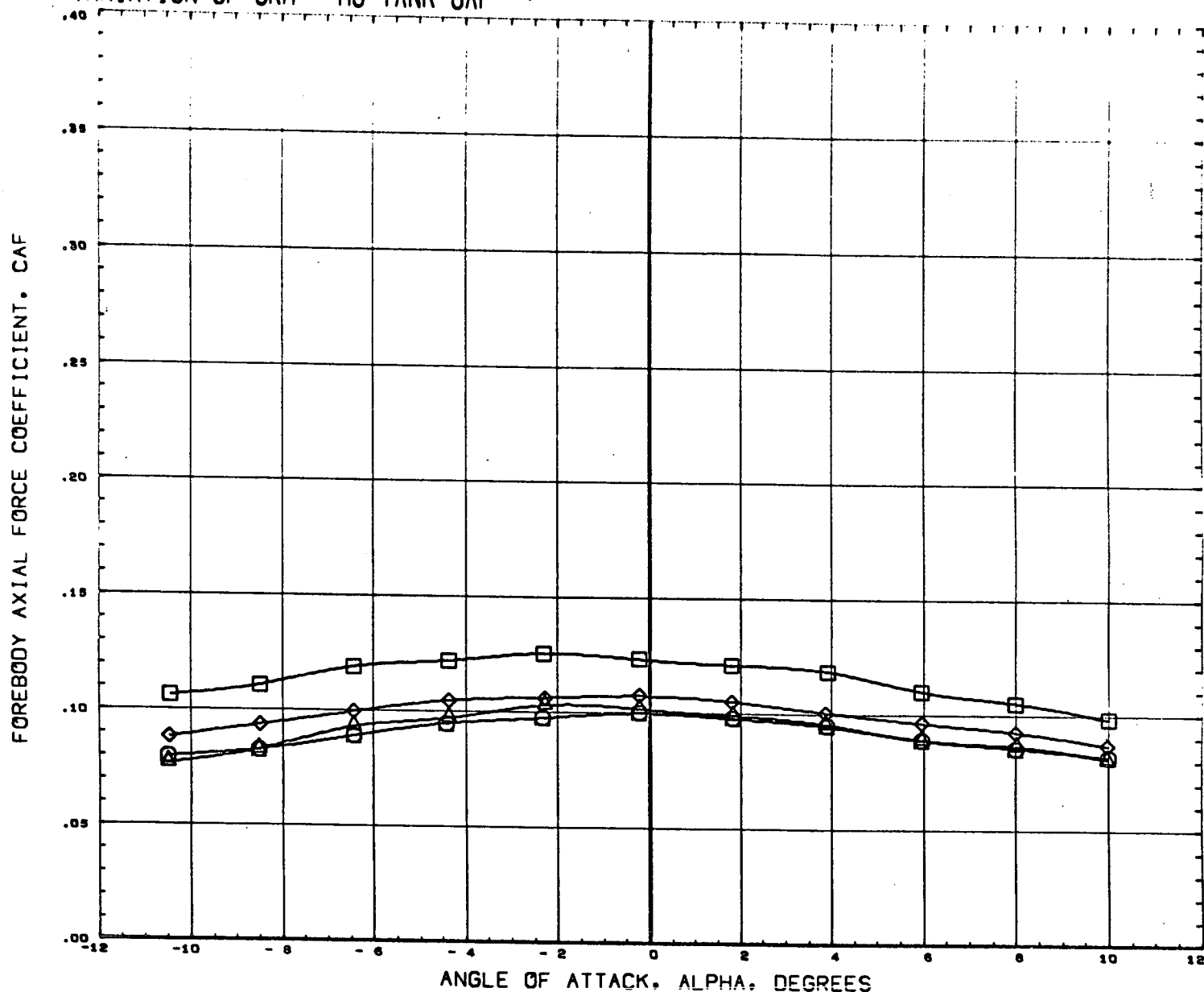


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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VARIATION OF SRM - HO TANK GAP

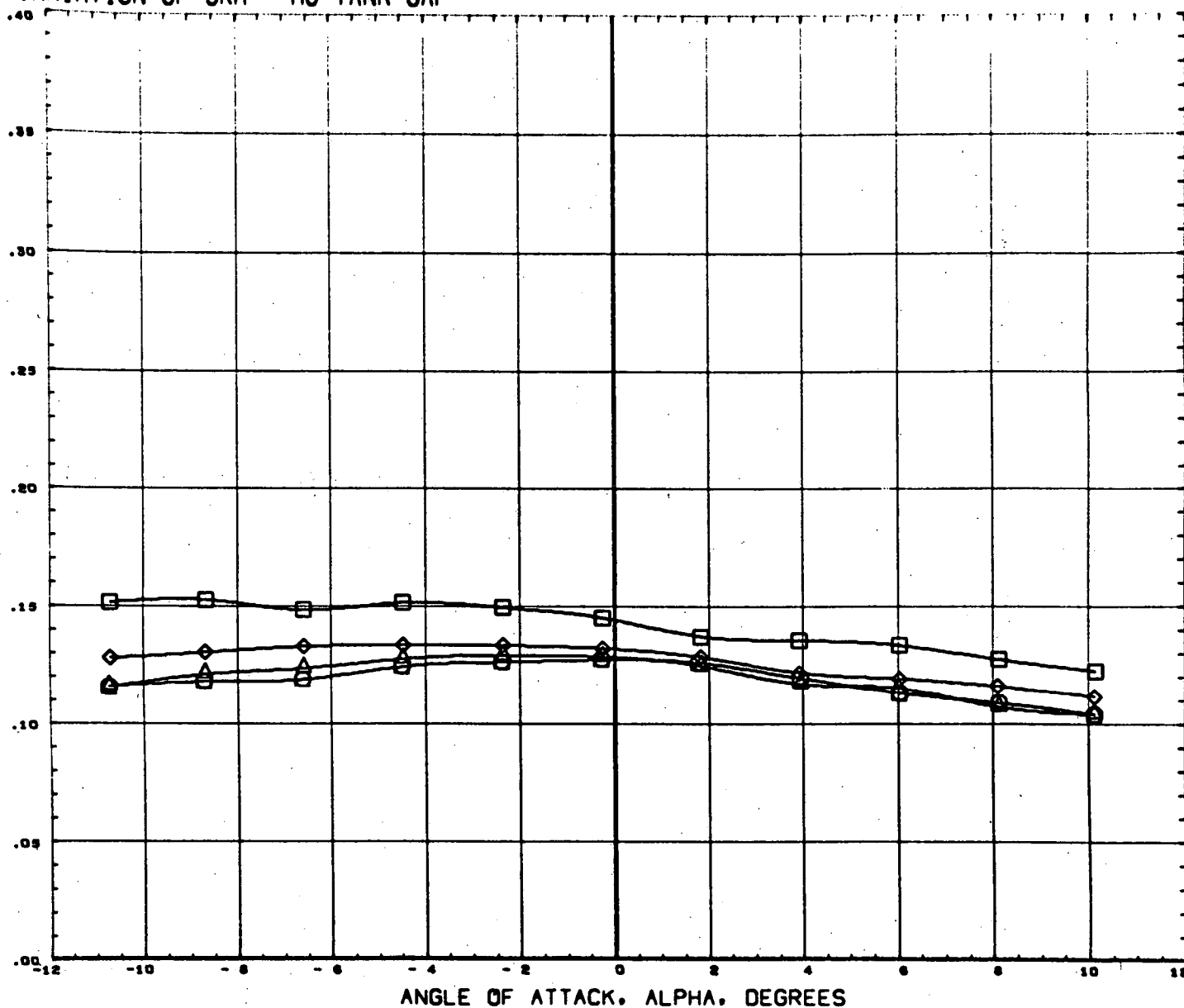


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B711089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

VARIATION OF SRM - HO TANK GAP

FOREBODY AXIAL FORCE COEFFICIENT, CAF



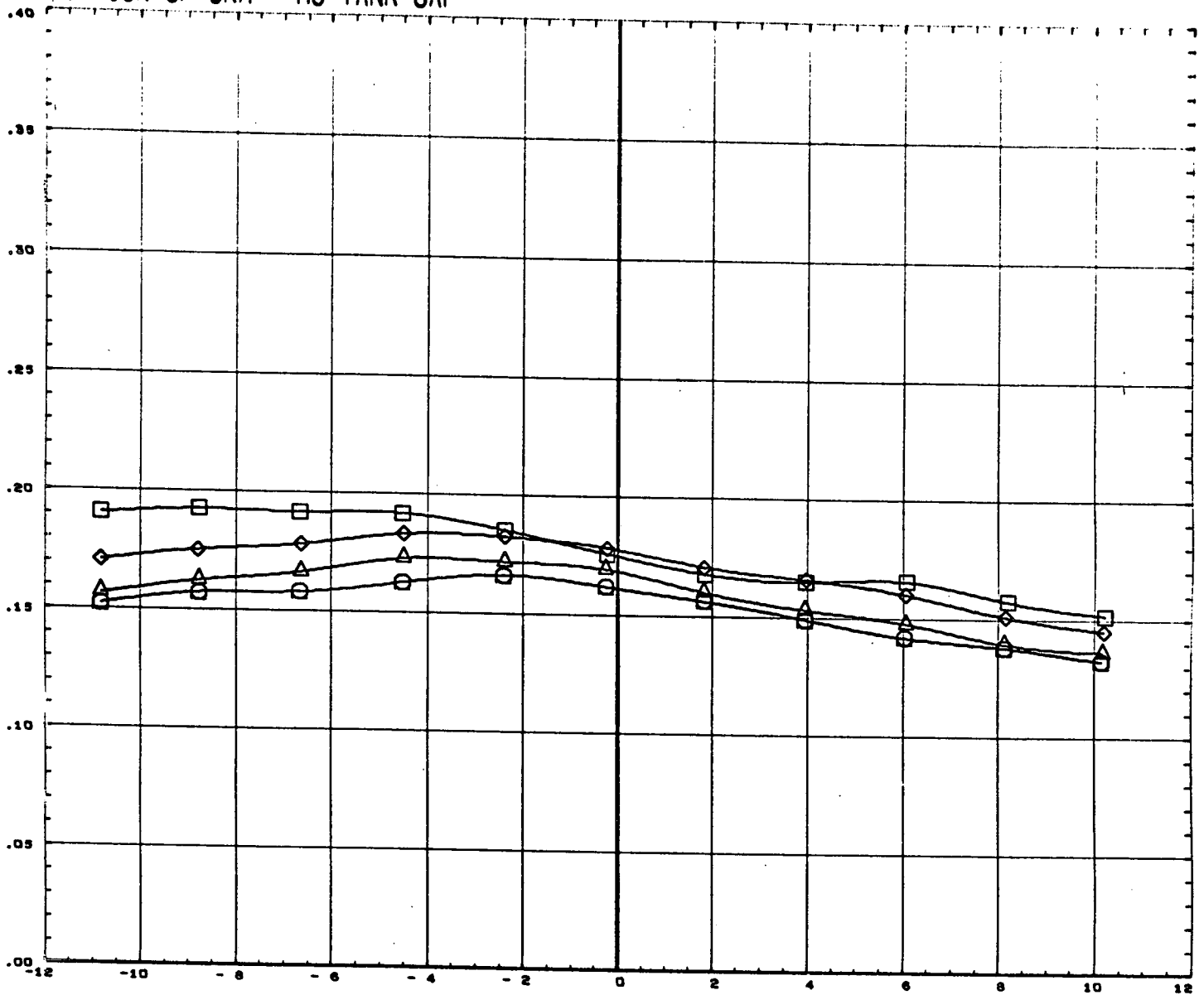
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B711069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30.1N. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4800 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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VARIATION OF SRM - H0 TANK GAP

FOREBODY AXIAL FORCE COEFFICIENT, CAF



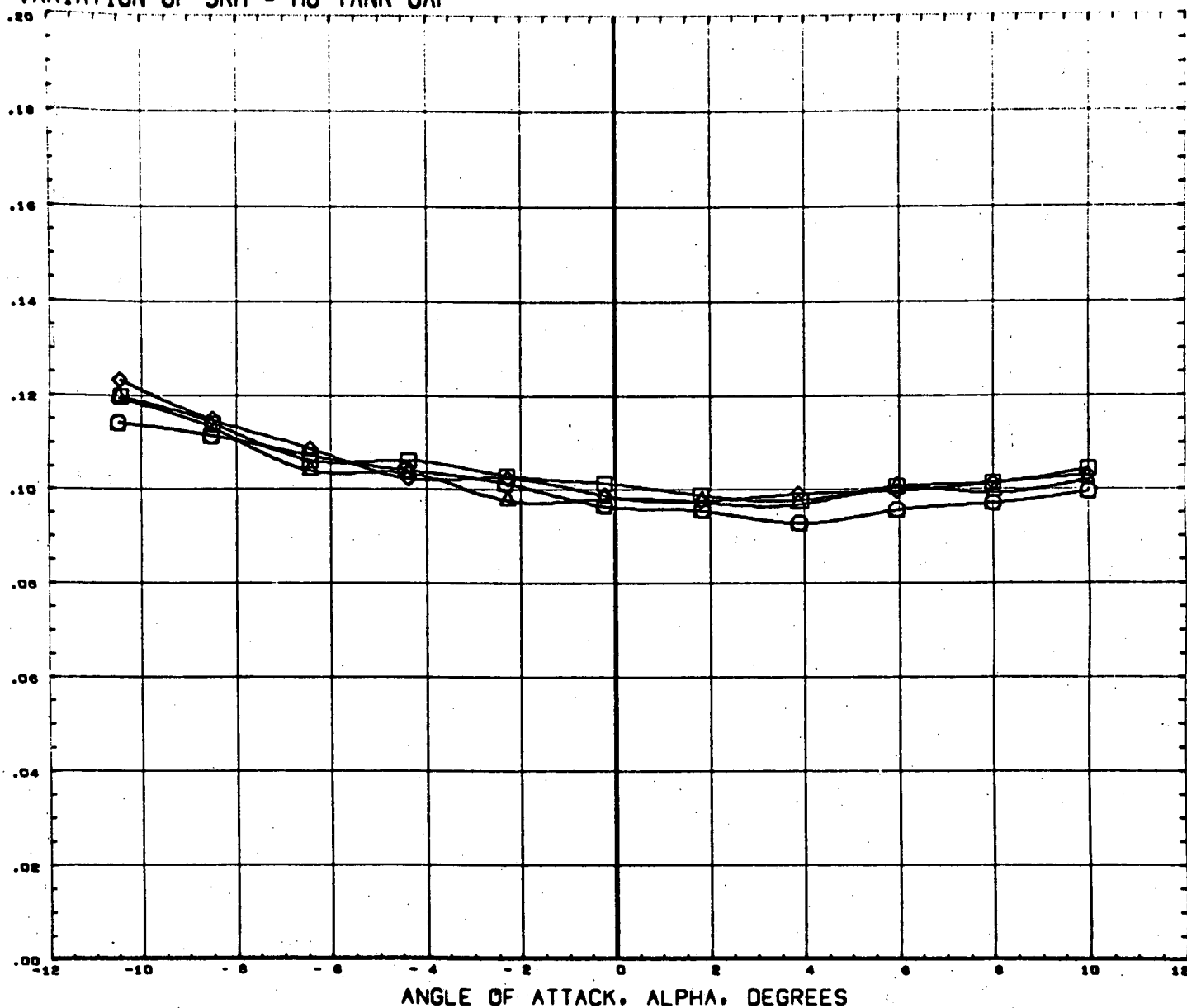
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

VARIATION OF SRM - HO TANK GAP

BASE AXIAL FORCE COEFFICIENT, CAB

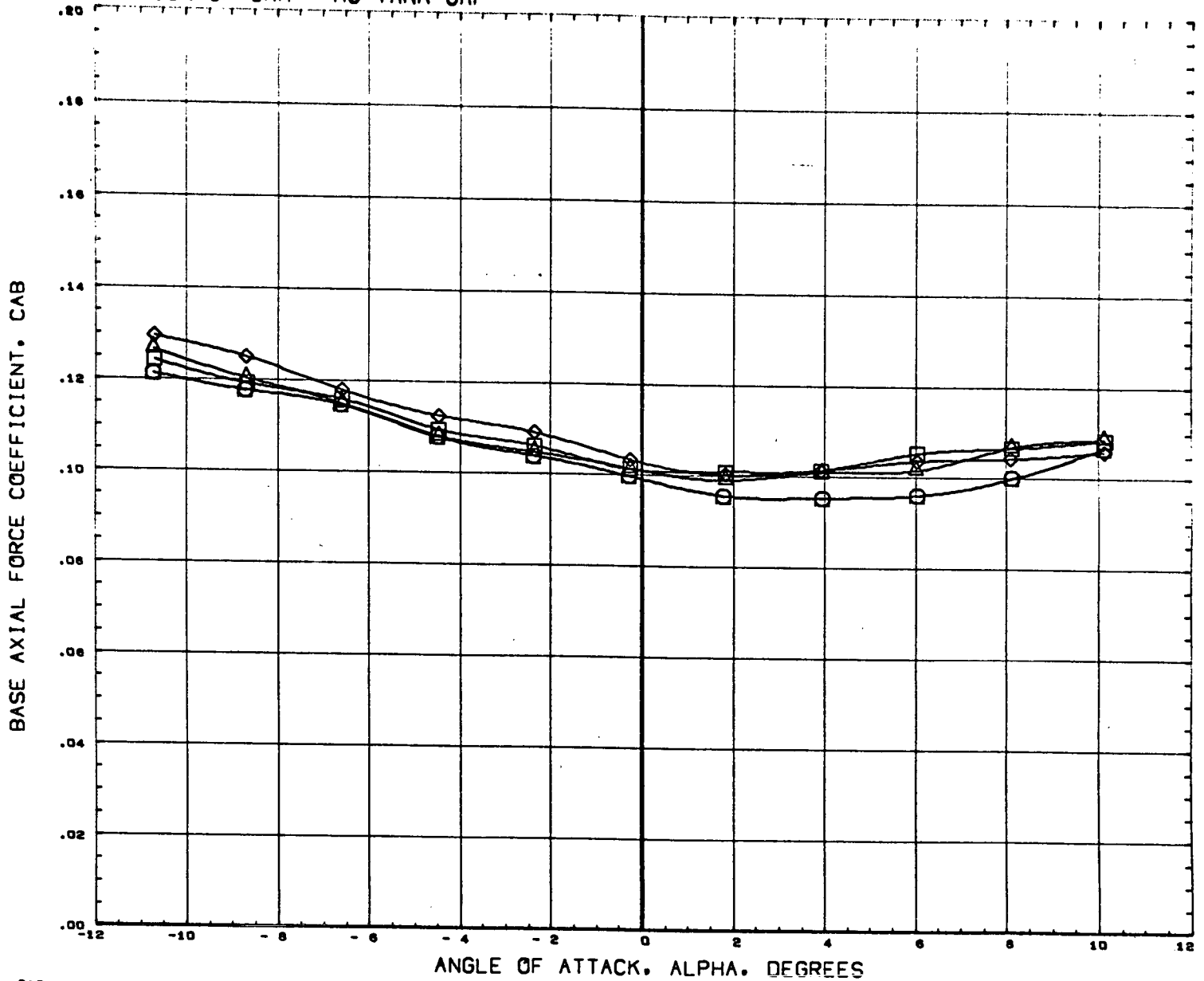


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | SRP | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2400 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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VARIATION OF SRM - HO TANK GAP

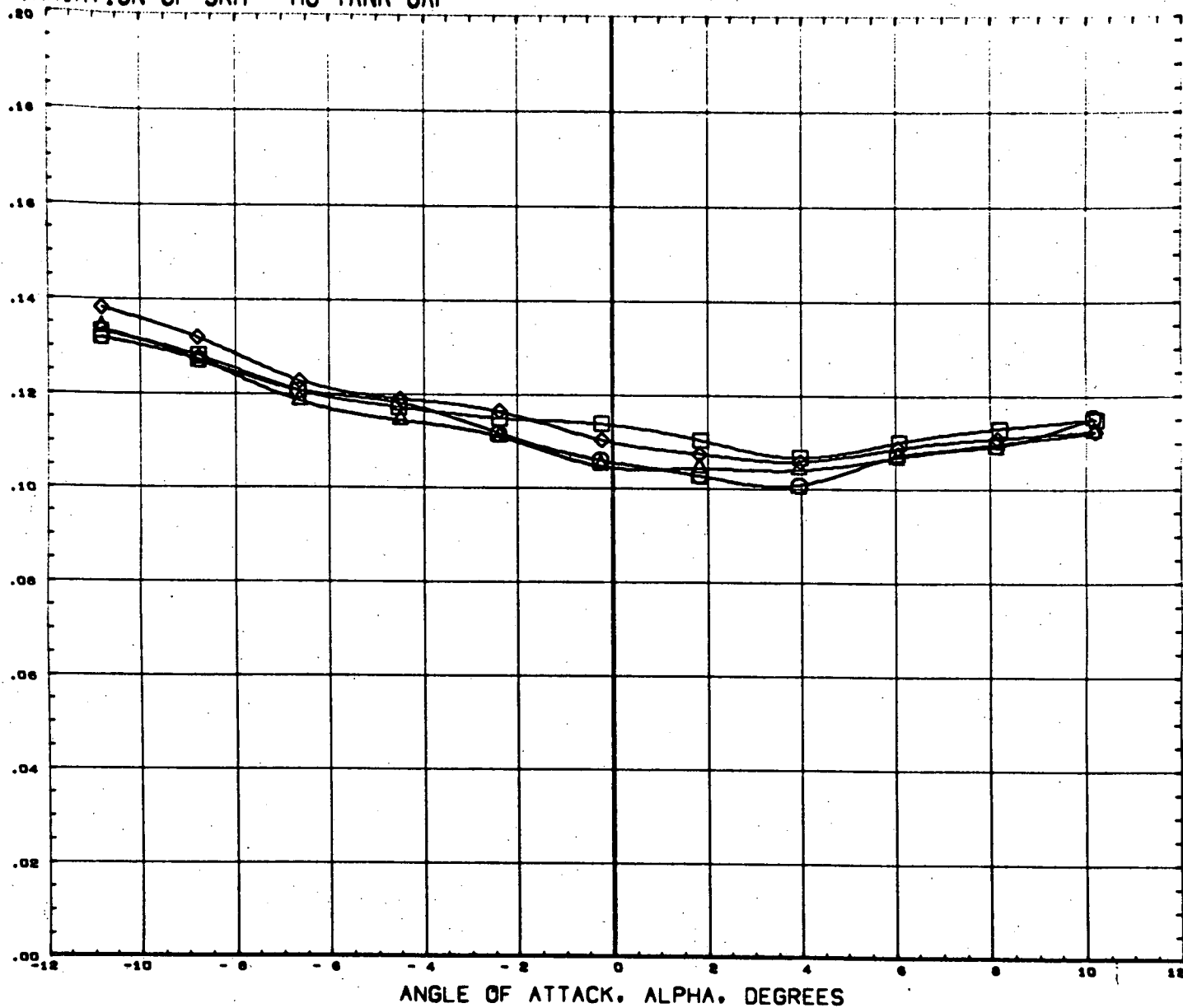


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

VARIATION OF SRM - HO TANK GAP

BASE AXIAL FORCE COEFFICIENT, CAB



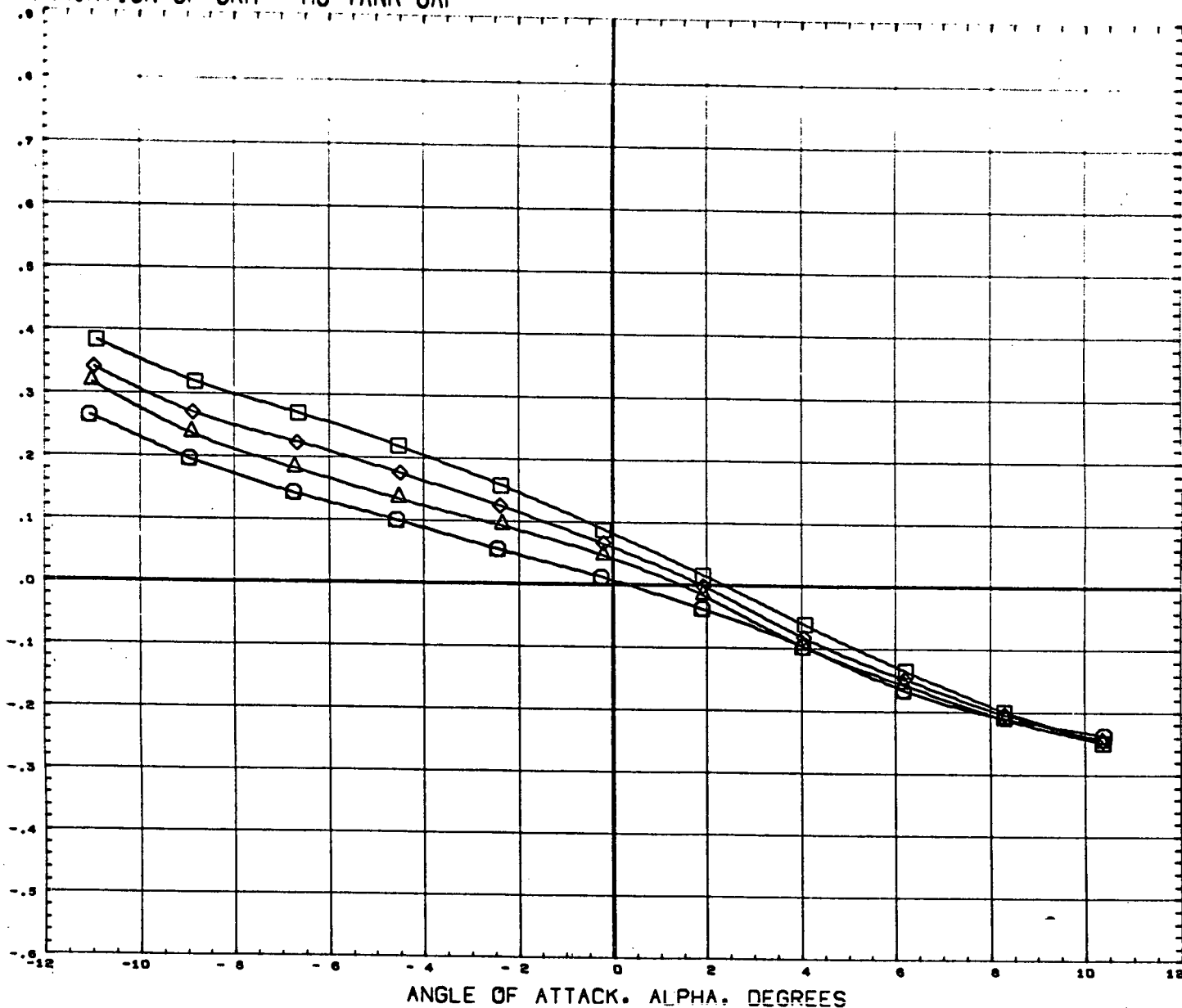
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 30. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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VARIATION OF SRM - HO TANK GAP

PITCHING MOMENT COEFFICIENT, CLM



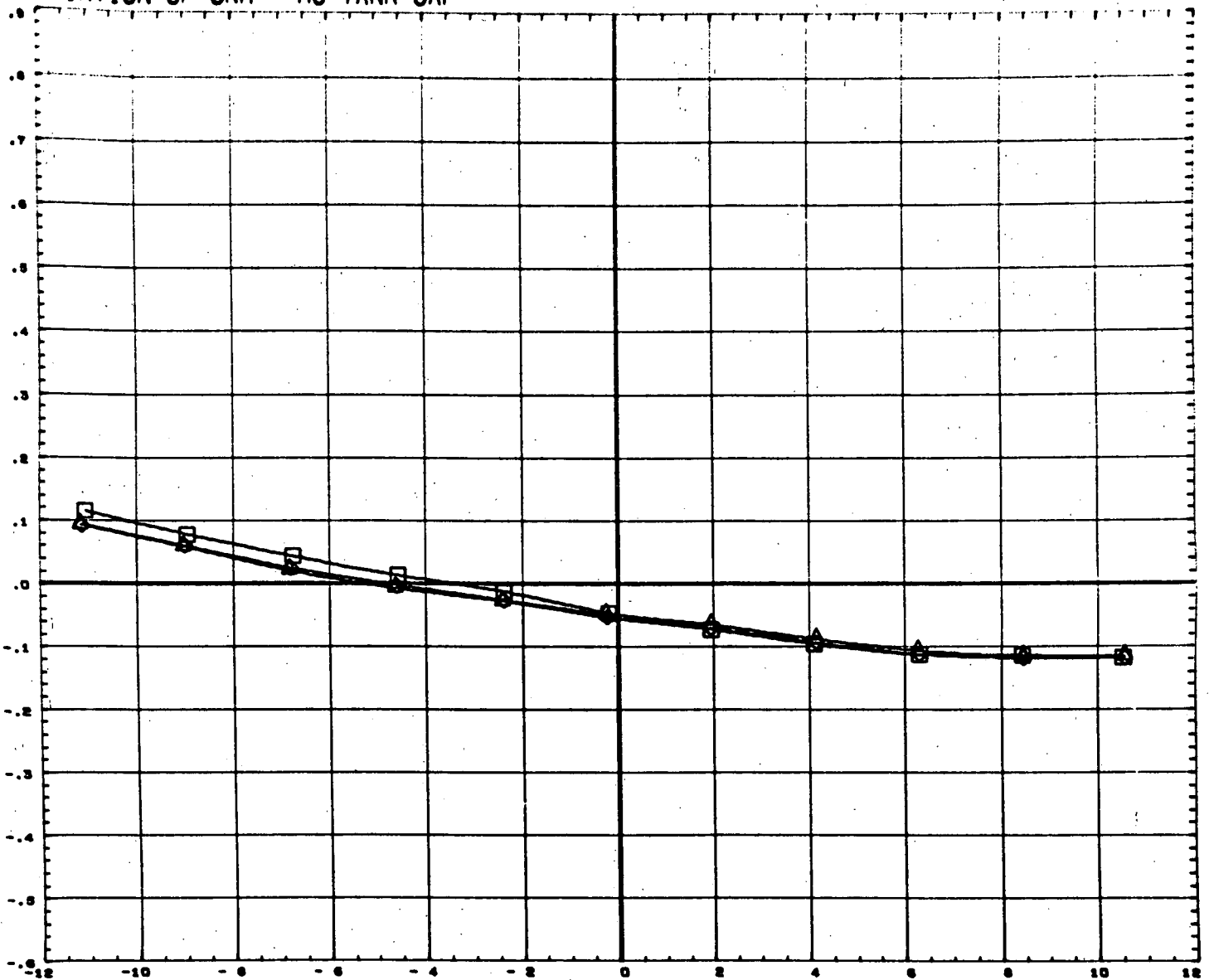
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (S71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (S71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (S71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (S71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

VARIATION OF SRM - HO TANK GAP

PITCHING MOMENT COEFFICIENT, CLM



ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET | SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|----------|--------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | ○ | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71103) | △ | NSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | ◇ | NSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71109) | □ | NSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | | YHRP | 0.0000 IN. |
| | | | | | | | ZHRP | 0.2460 IN. |
| | | | | | | | SCALE | 0.0040 SCALE |

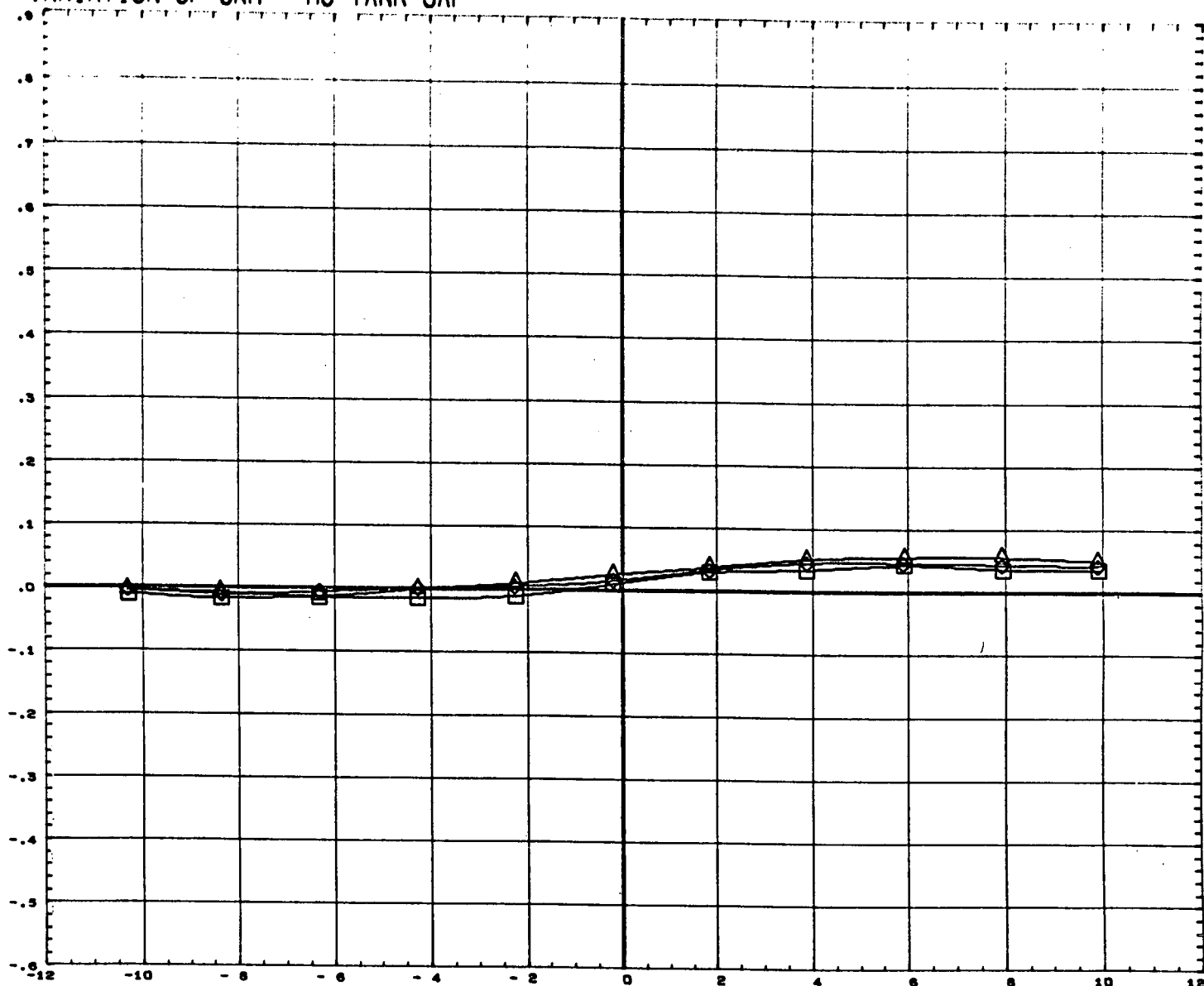
MACH

1.95

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VARIATION OF SRM - HO TANK GAP

PITCHING MOMENT COEFFICIENT, CLM



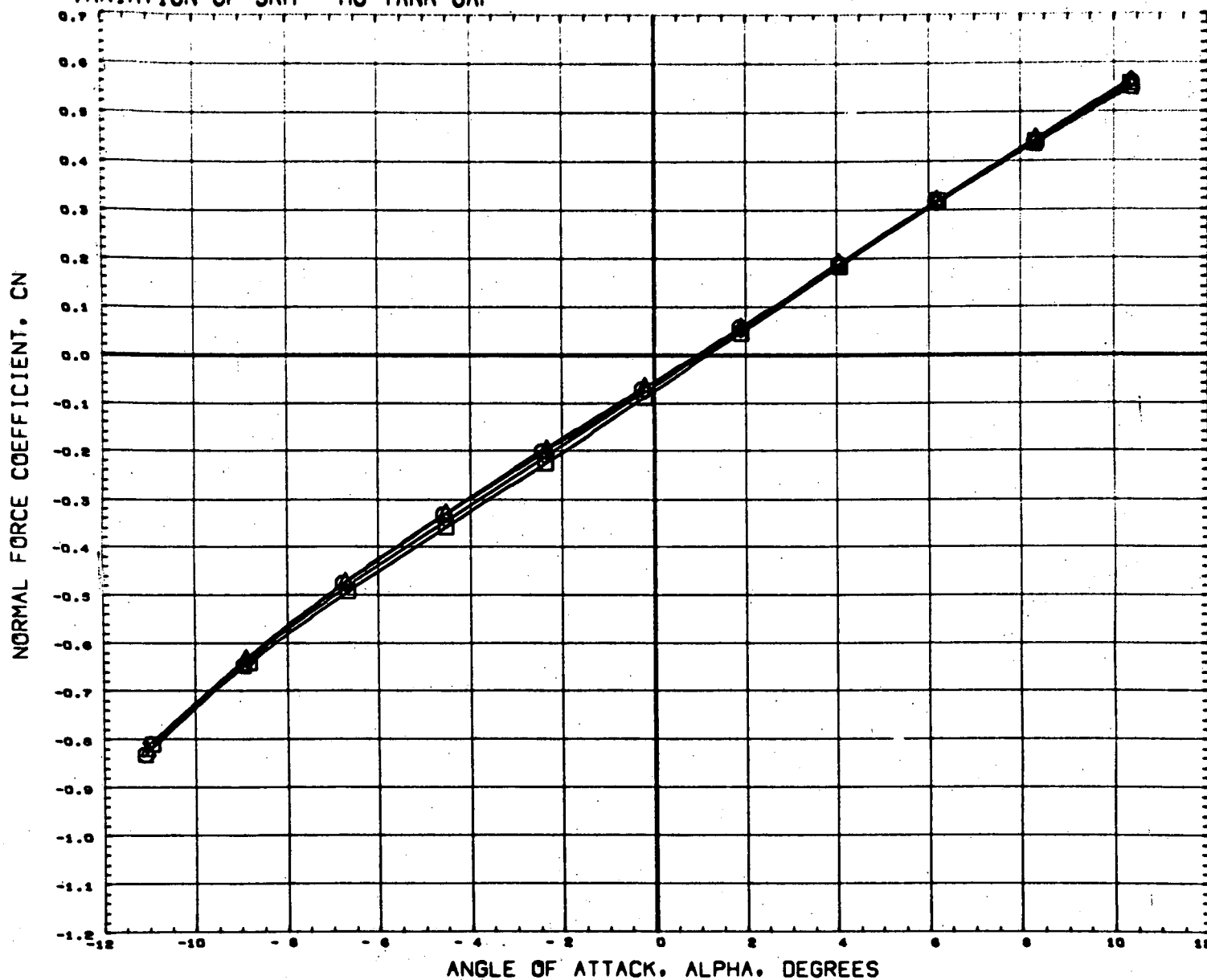
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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VARIATION OF SRM - HO TANK GAP

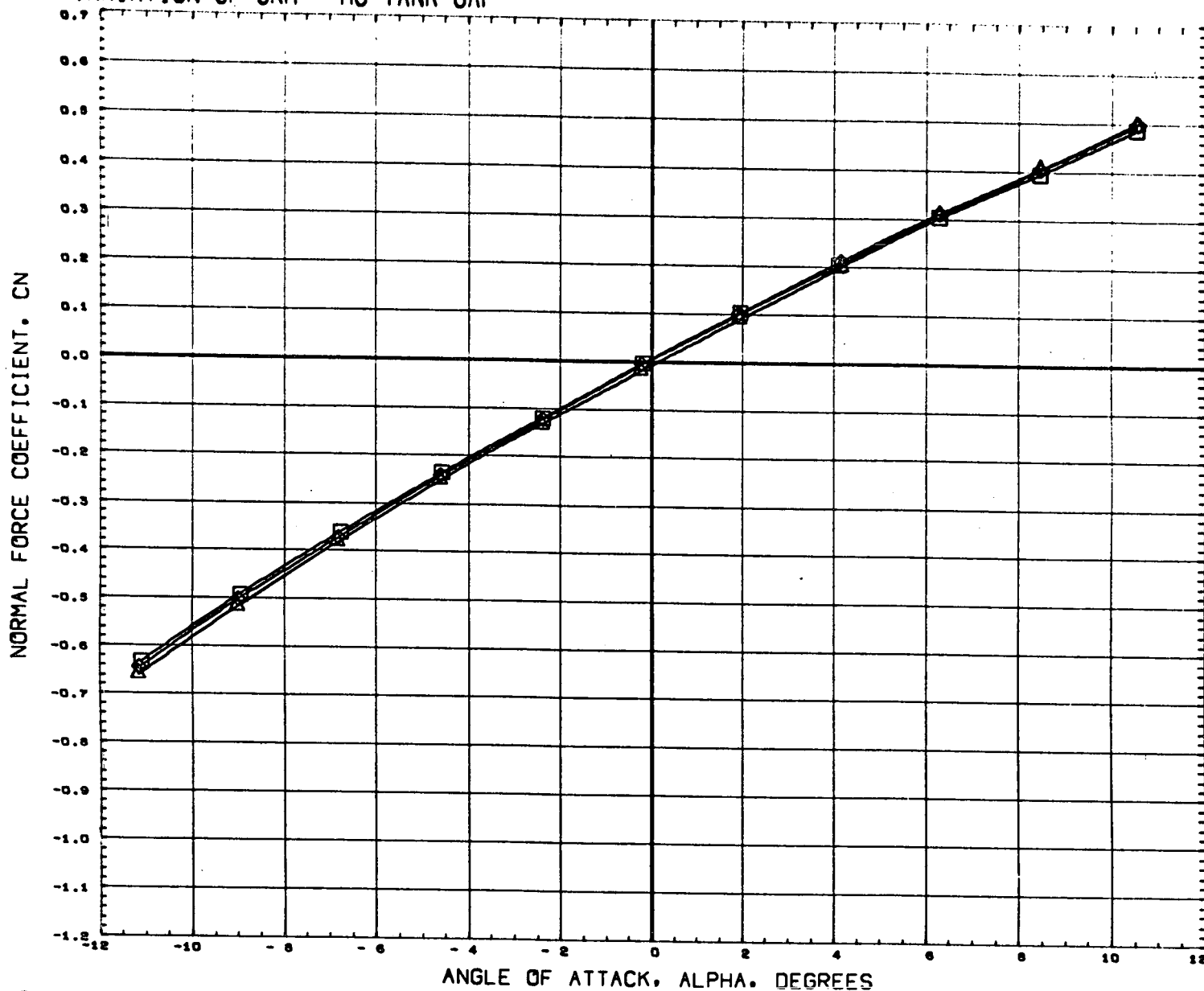


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6800 30. IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREP | 4.4600 IN. |
| | | | | | | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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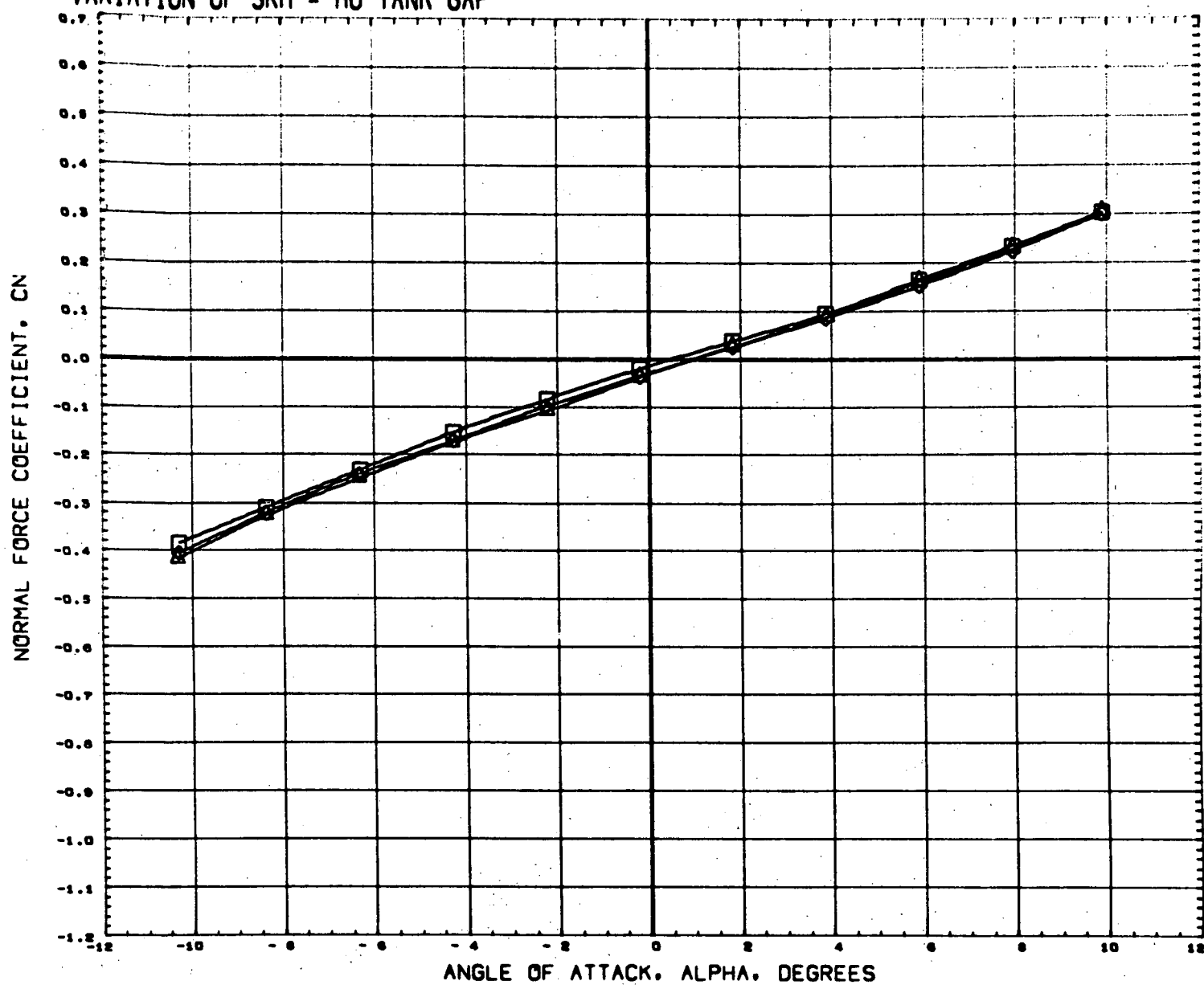
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

VARIATION OF SRM - HO TANK GAP

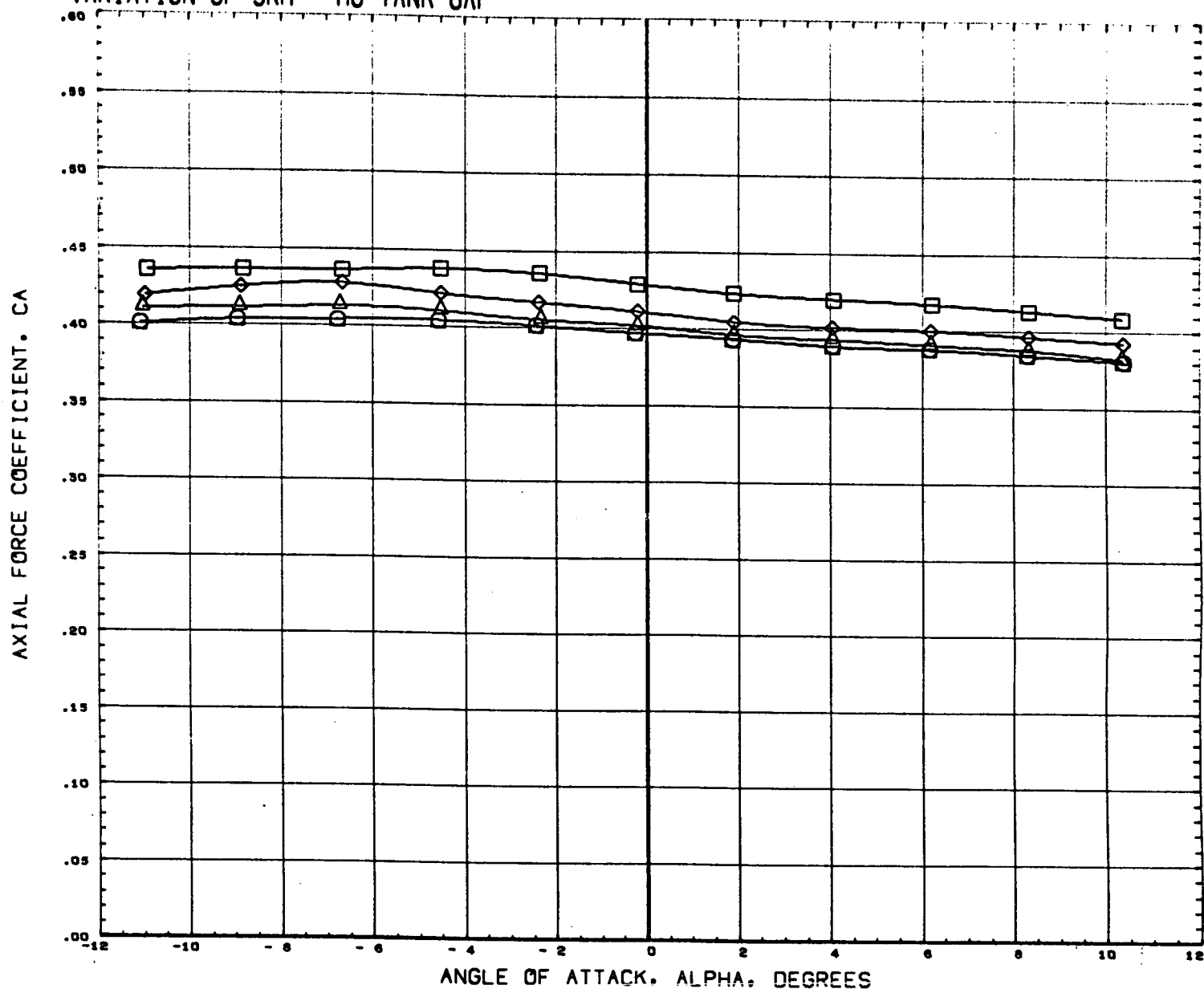


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8600 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.073 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.123 | 0.000 | 0.000 | SREP | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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VARIATION OF SRM - HO TANK GAP

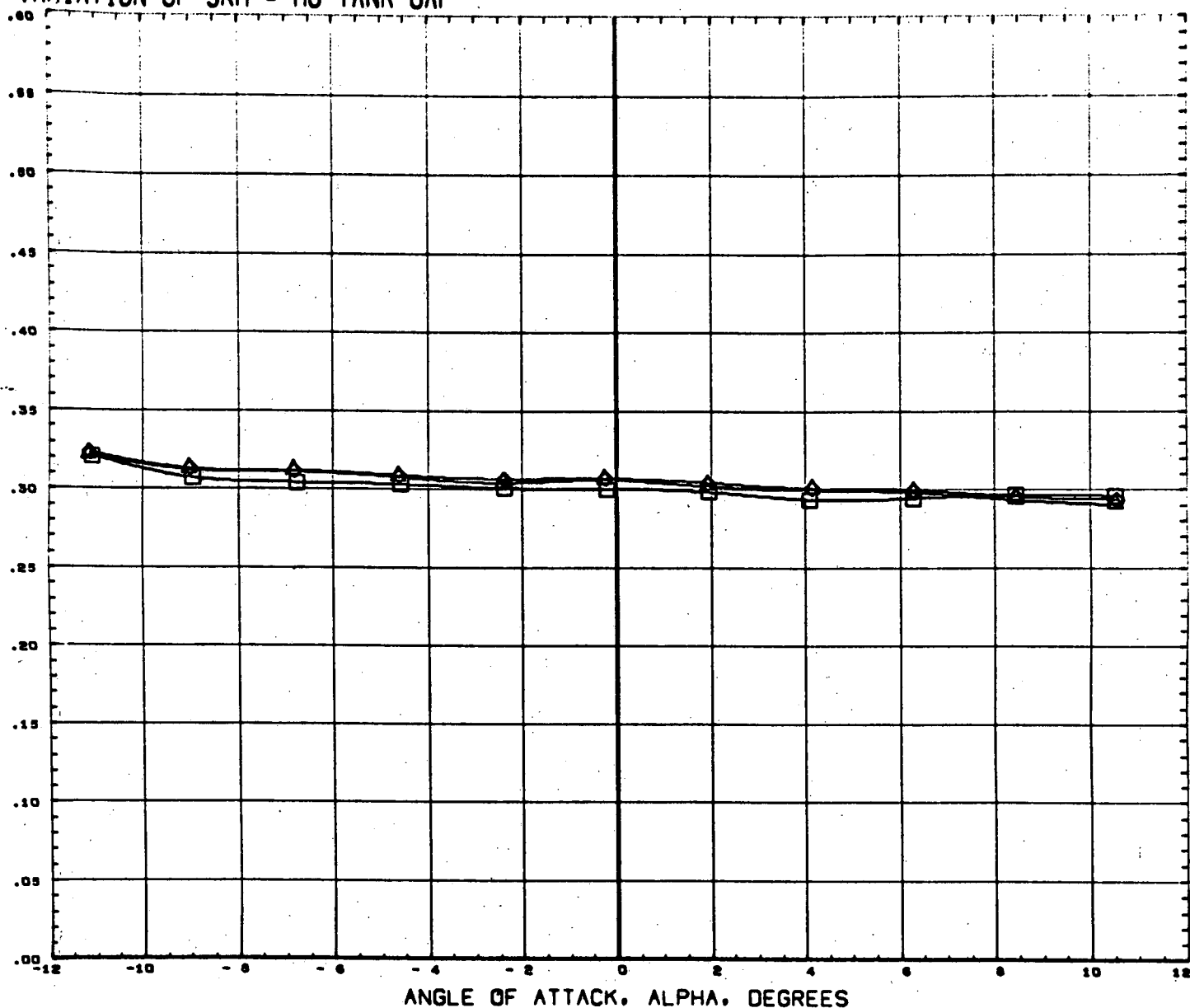


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

VARIATION OF SRM - HO TANK GAP

AXIAL FORCE COEFFICIENT, C_A

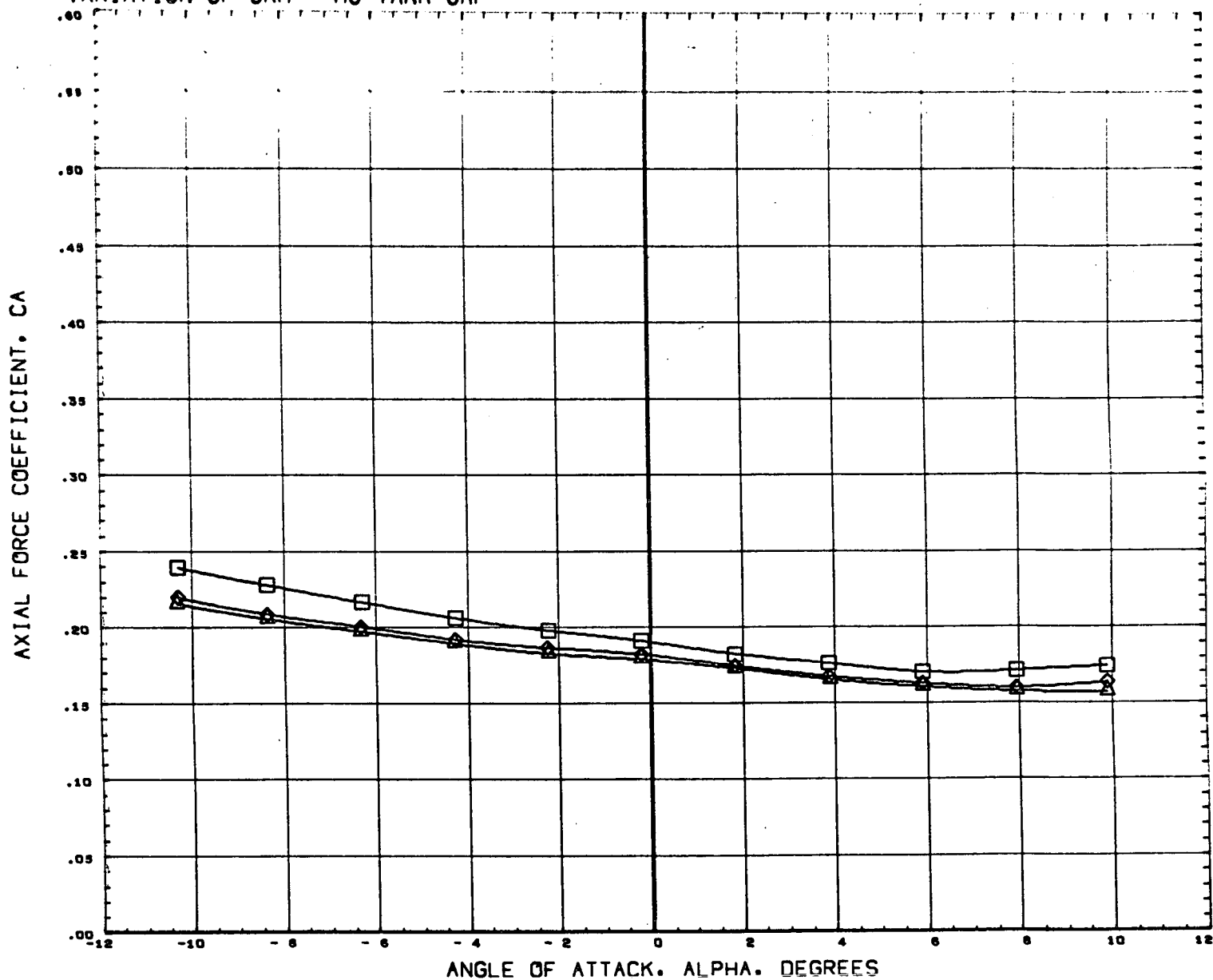


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2400 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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VARIATION OF SRM - HQ TANK GAP

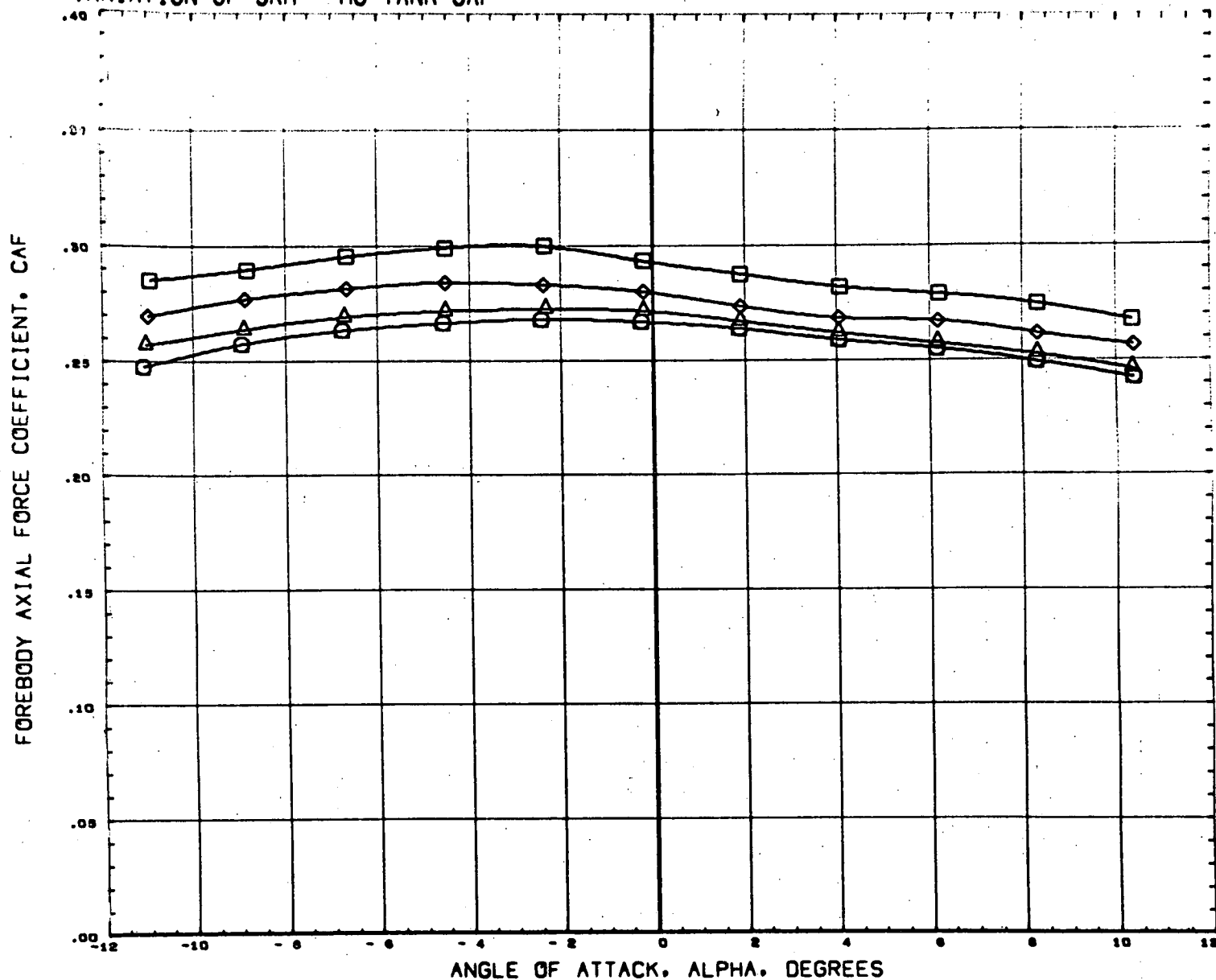


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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VARIATION OF SRM - HO TANK GAP



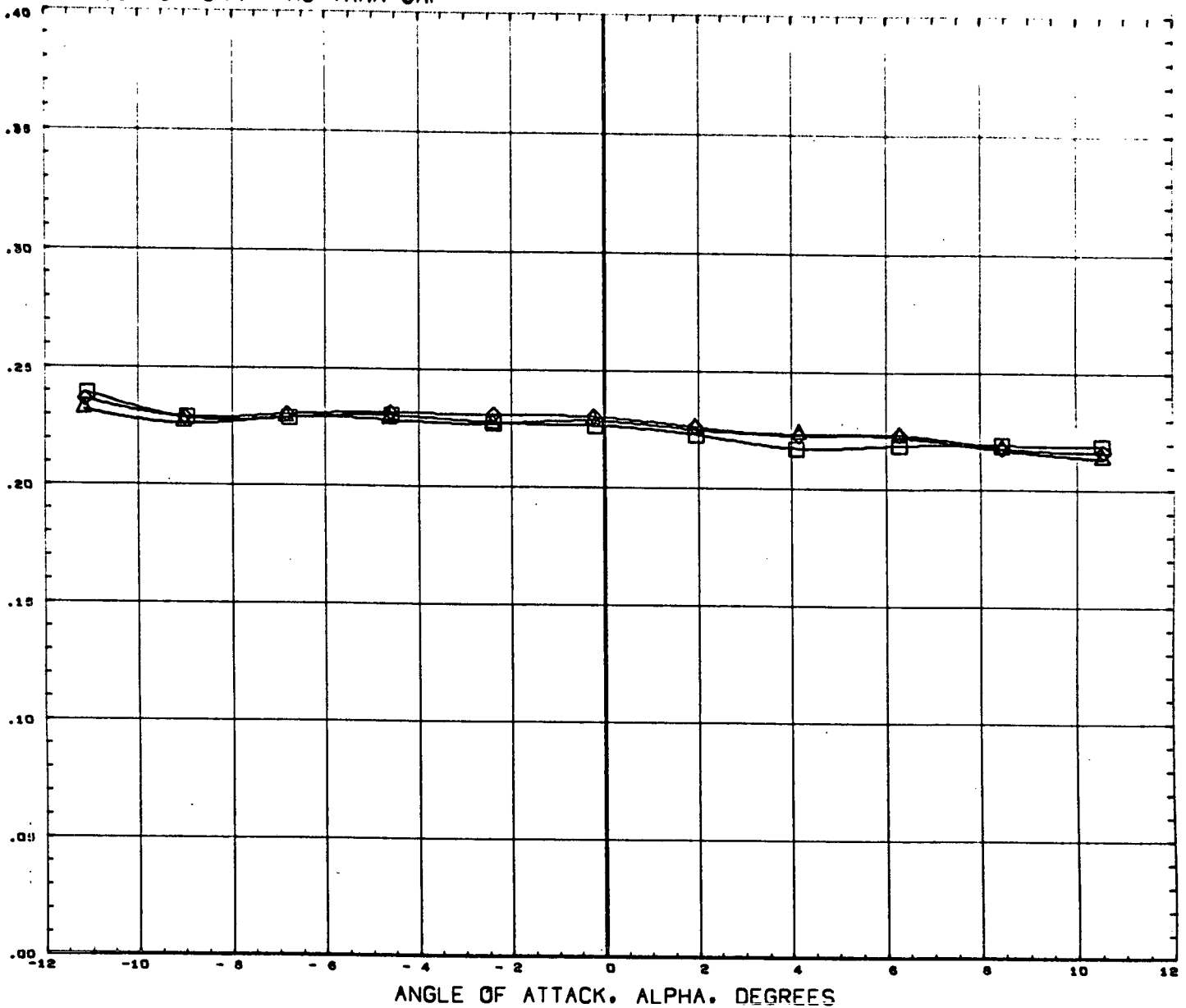
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|---------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ.IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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VARIATION OF SRM - HO TANK GAP

FOREBODY AXIAL FORCE COEFFICIENT, CAF

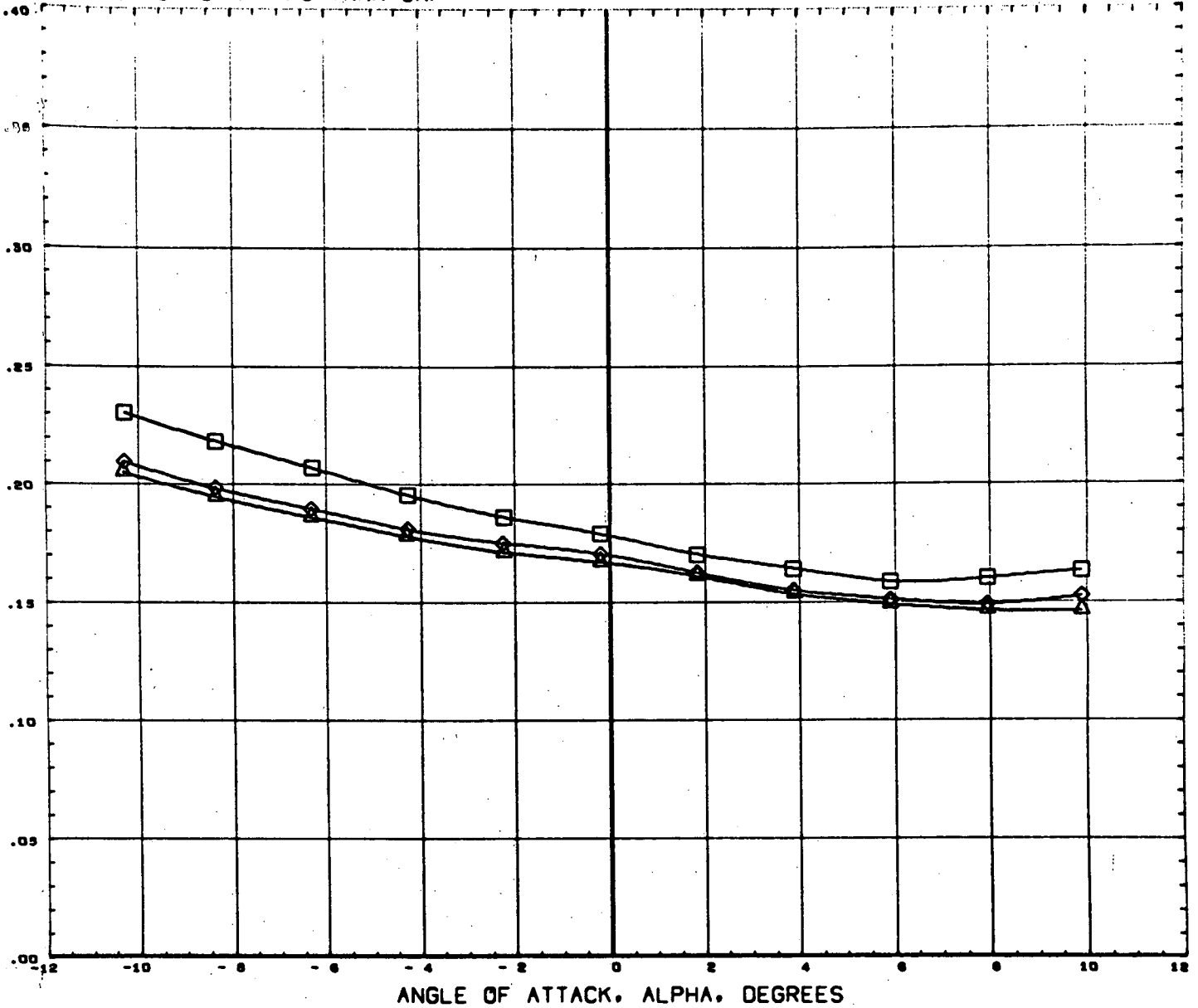


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

VARIATION OF SRM - HO TANK GAP

FOREBODY AXIAL FORCE COEFFICIENT, CAF

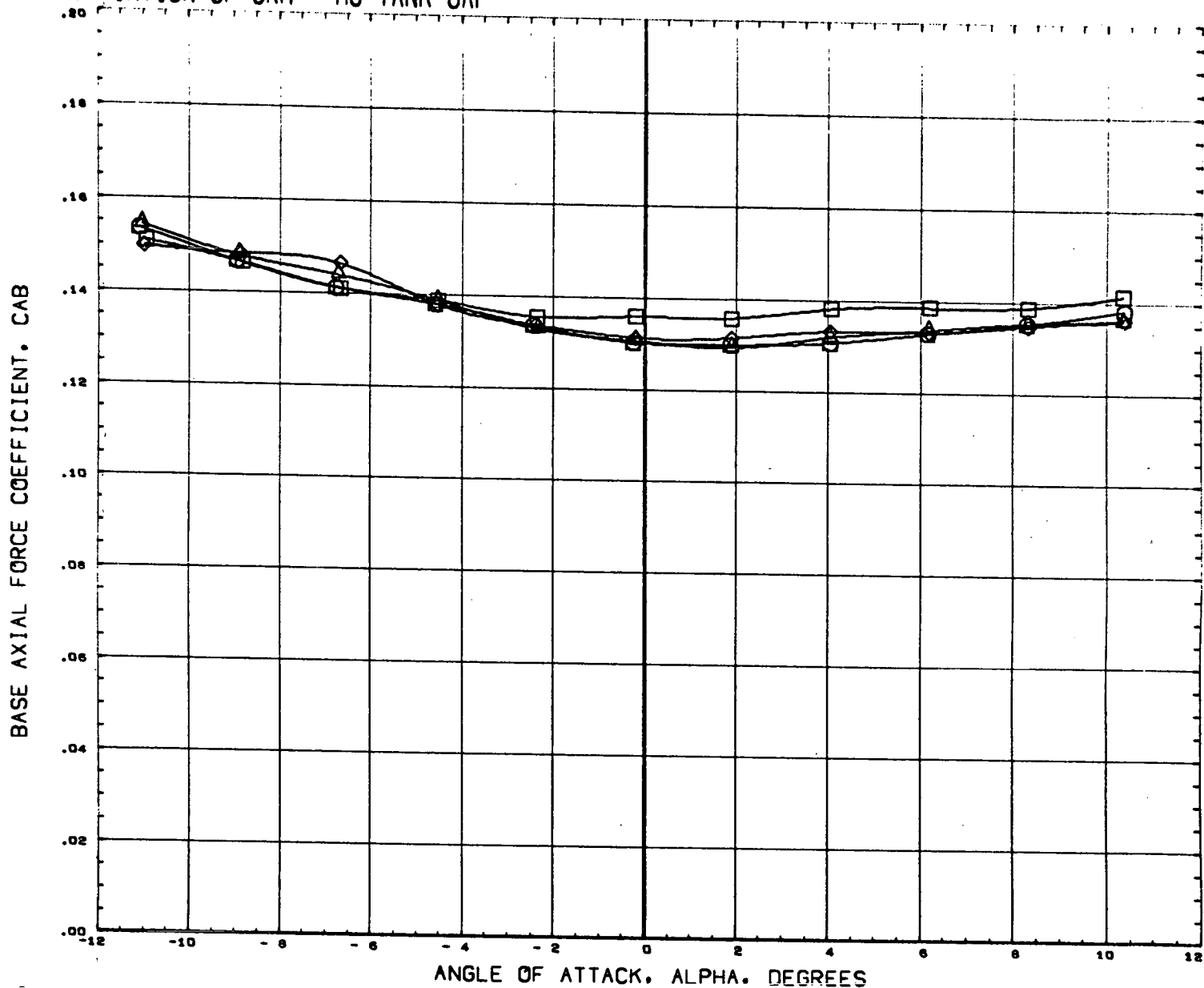


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71105) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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VARIATION OF SRM - HO TANK GAP

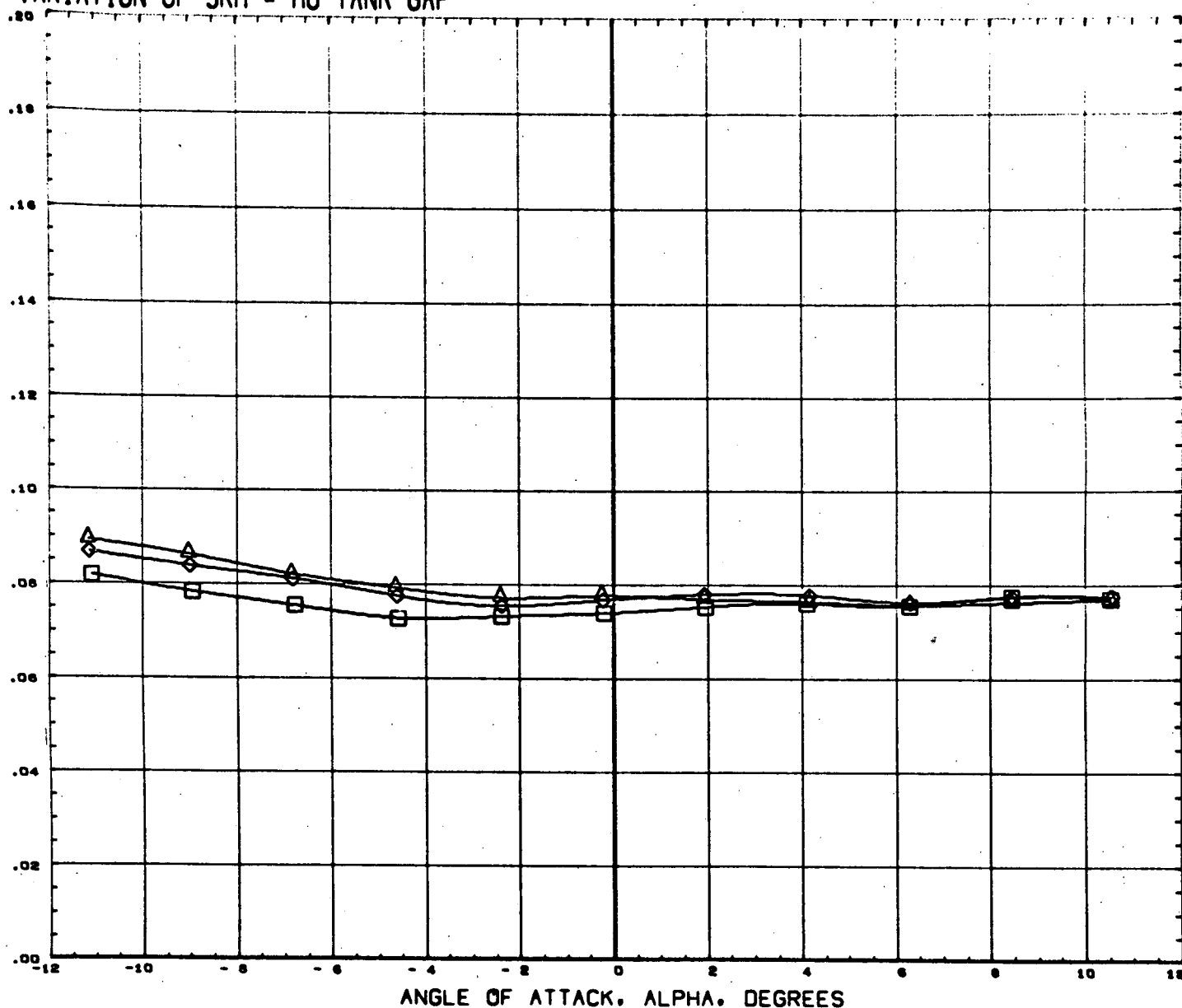


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

VARIATION OF SRM - HO TANK GAP

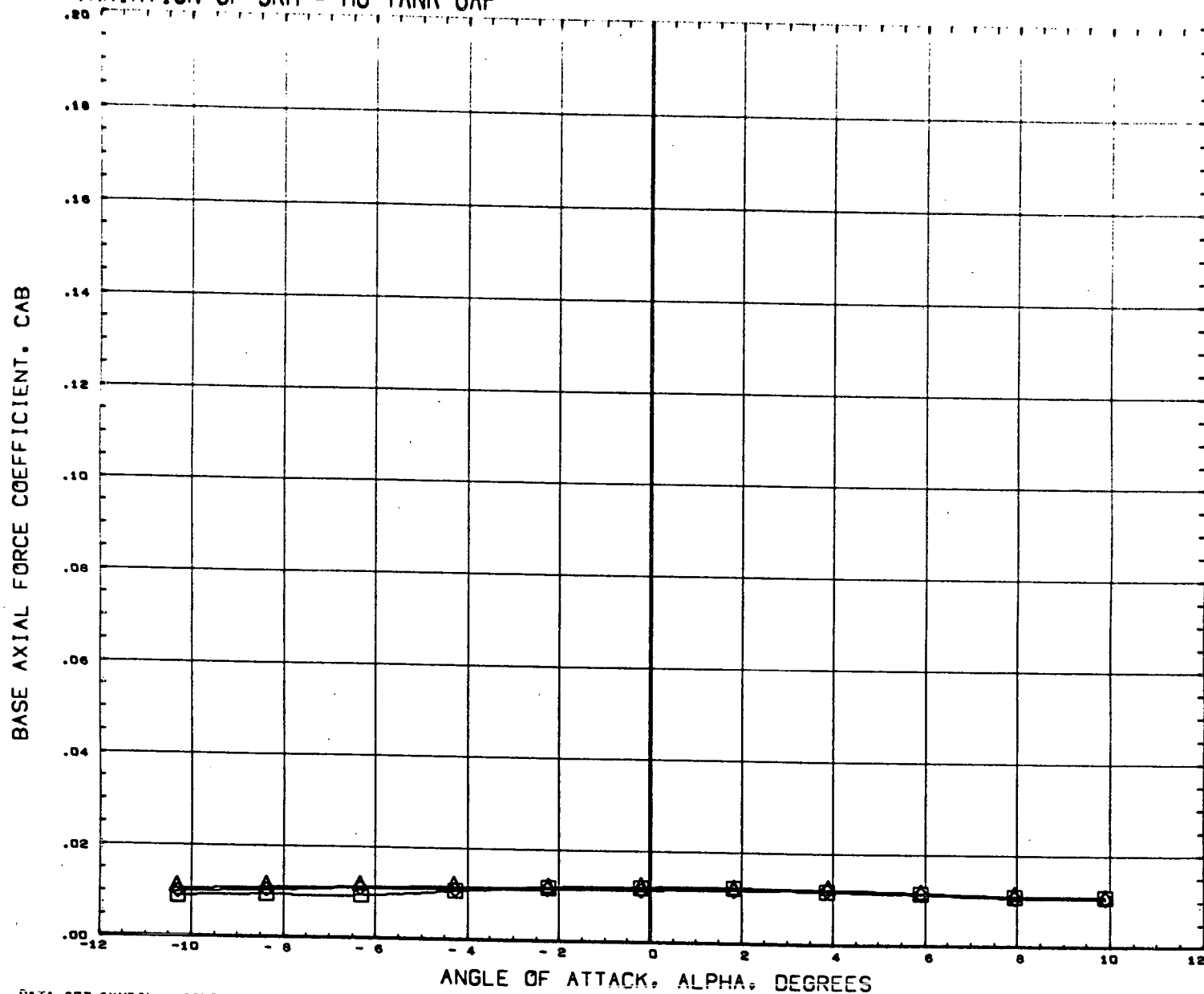
BASE AXIAL FORCE COEFFICIENT, C_{AB}



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

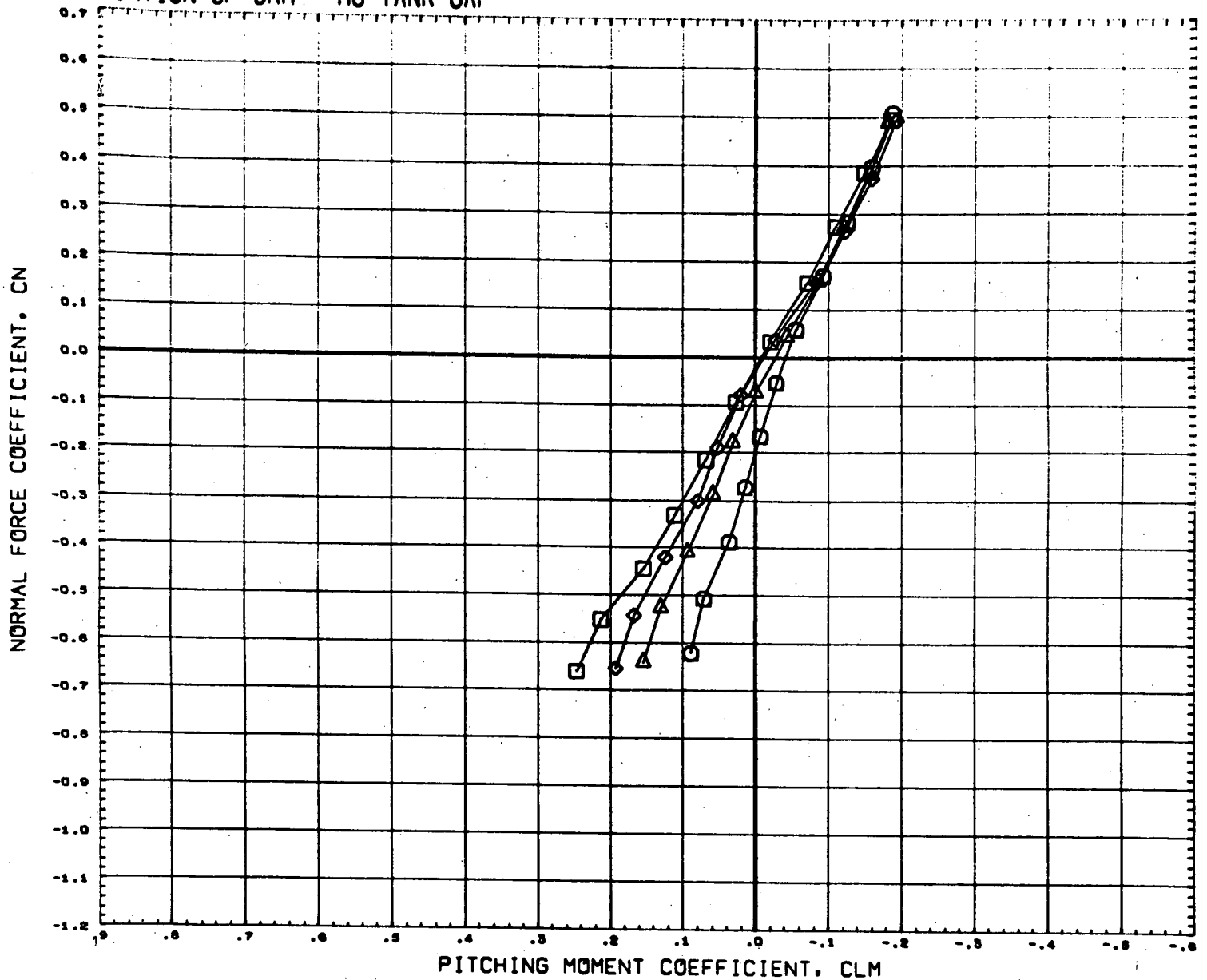
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 S2.IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

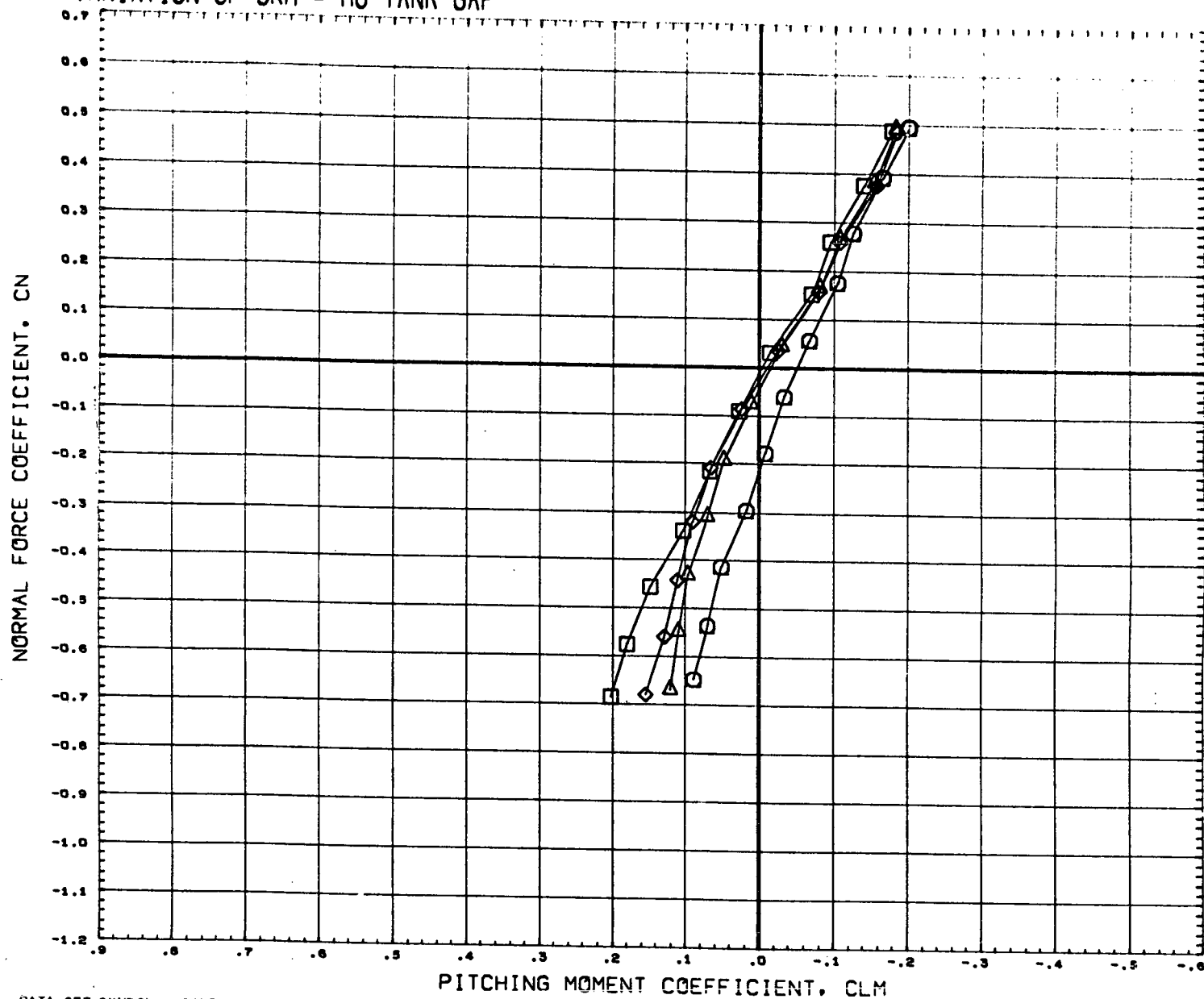
VARIATION OF SRM - HQ TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|---------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ.IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

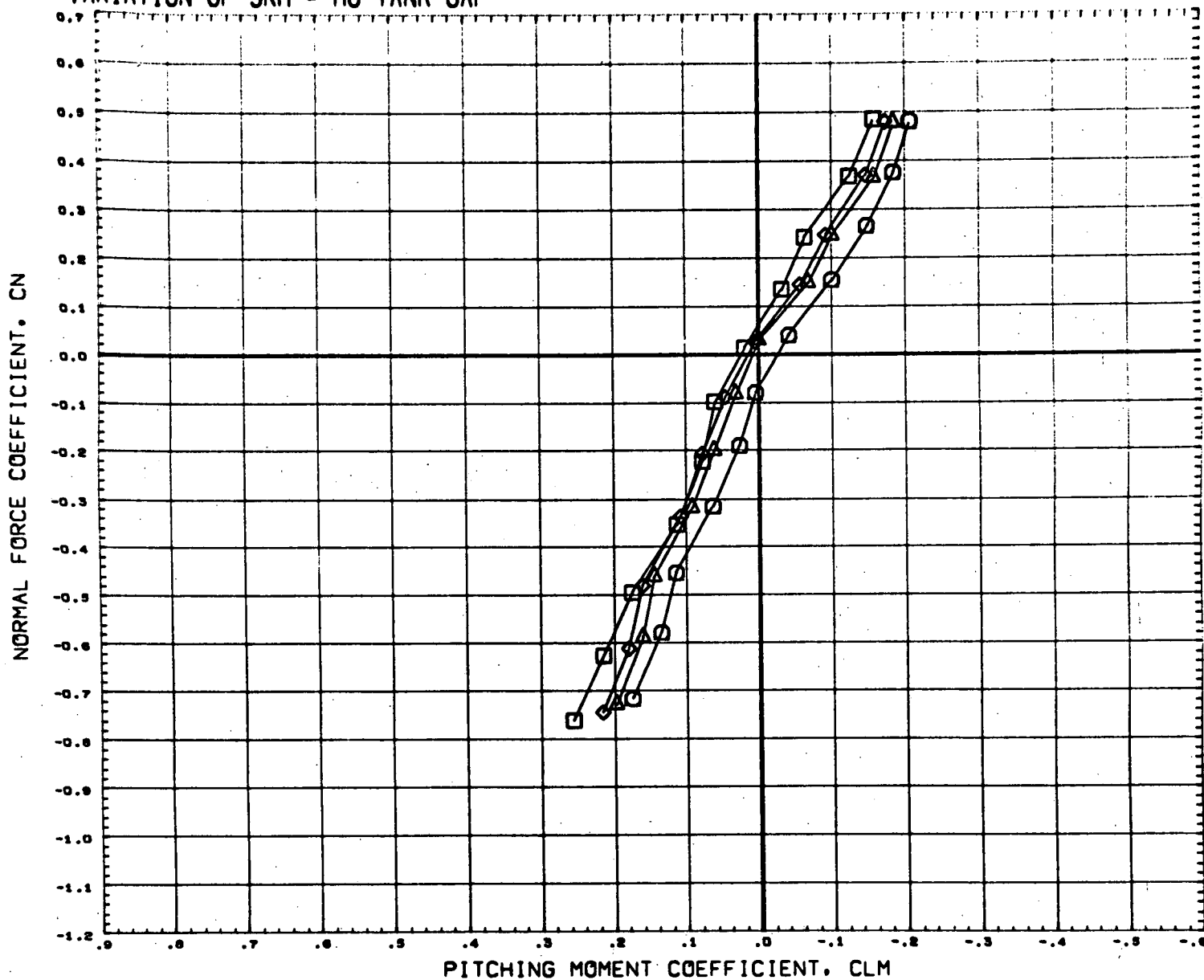
VARIATION OF SRM - H0 TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

VARIATION OF SRM - HQ TANK GAP

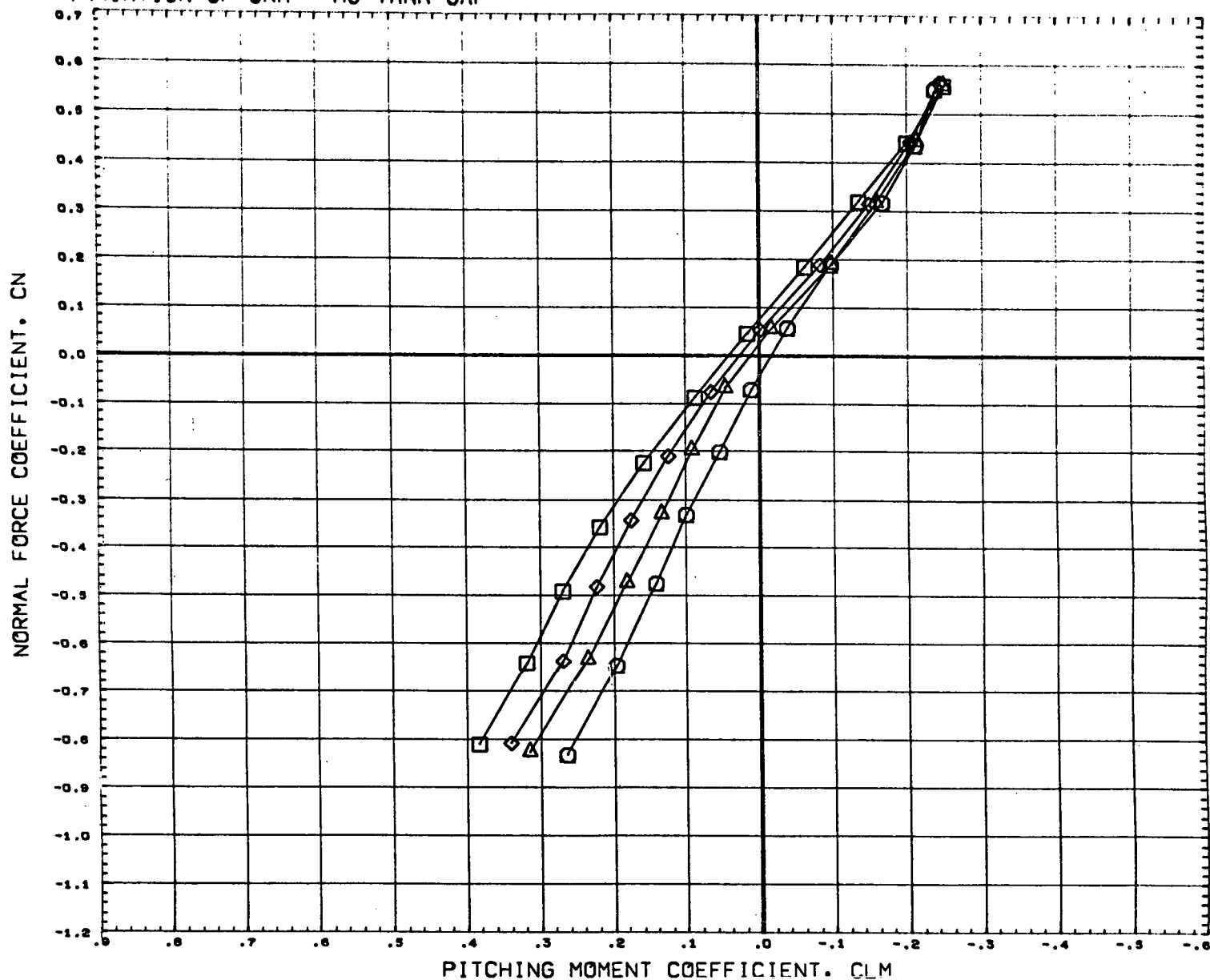


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 30. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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VARIATION OF SRM - HO TANK GAP

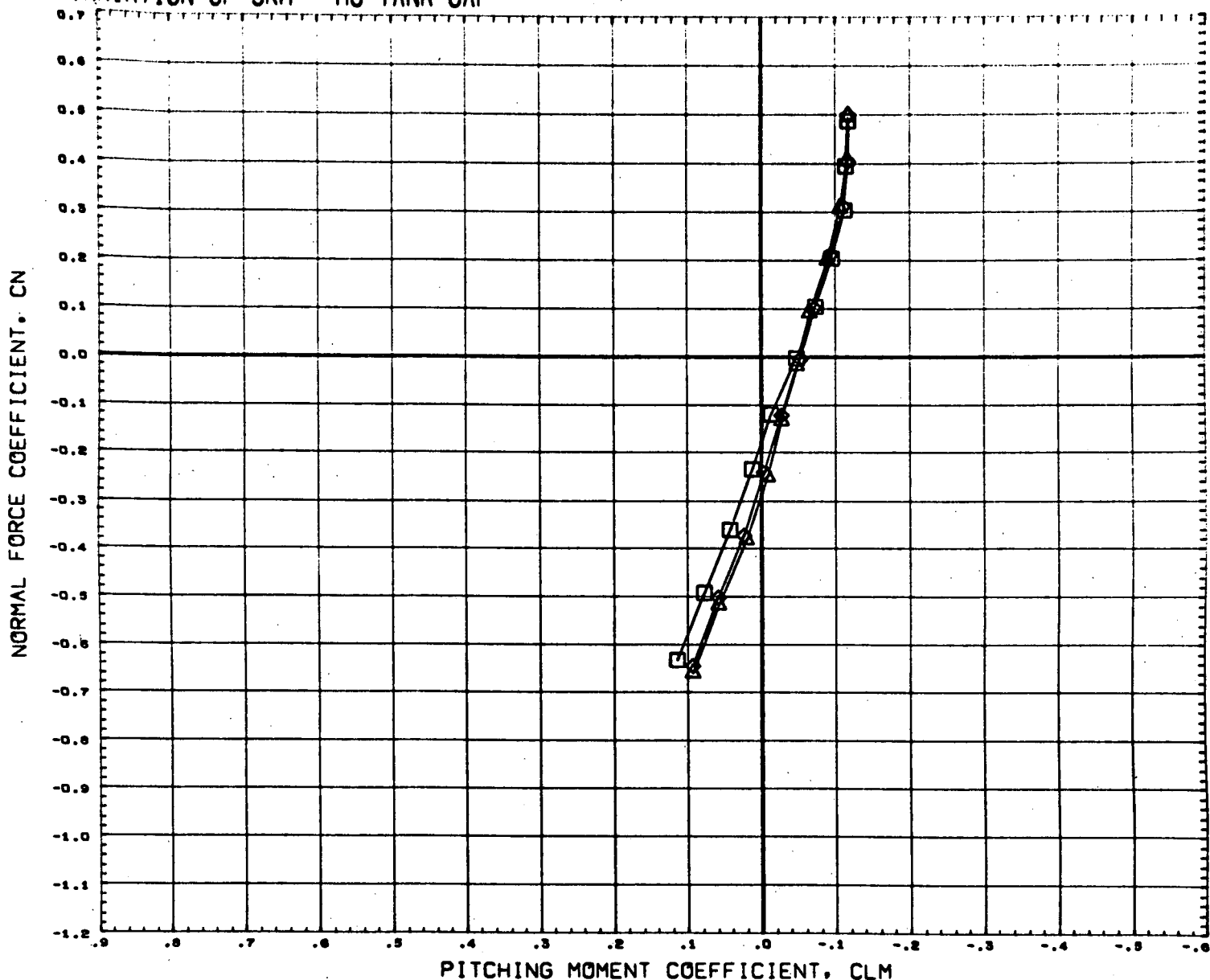


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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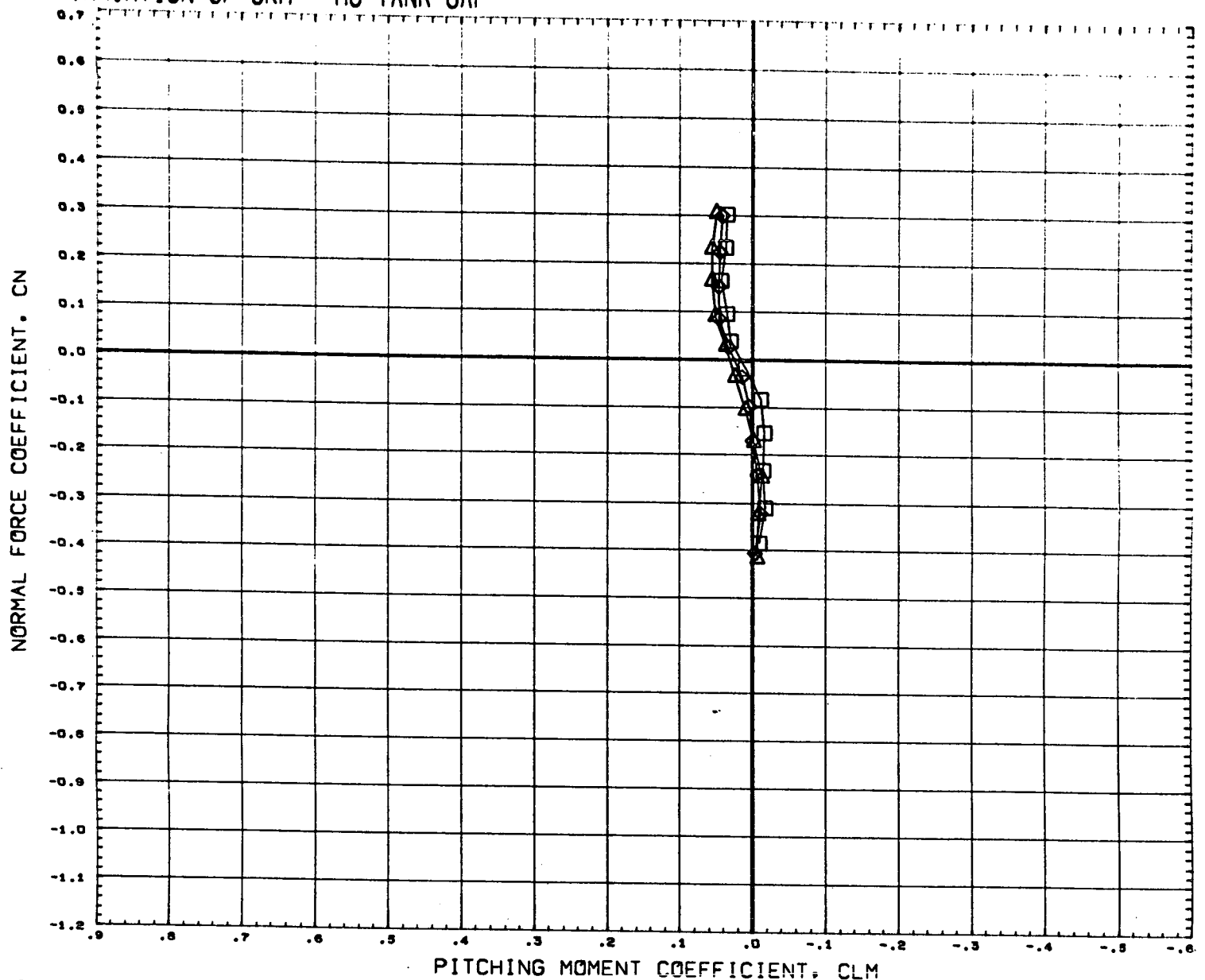
VARIATION OF SRM - HQ TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

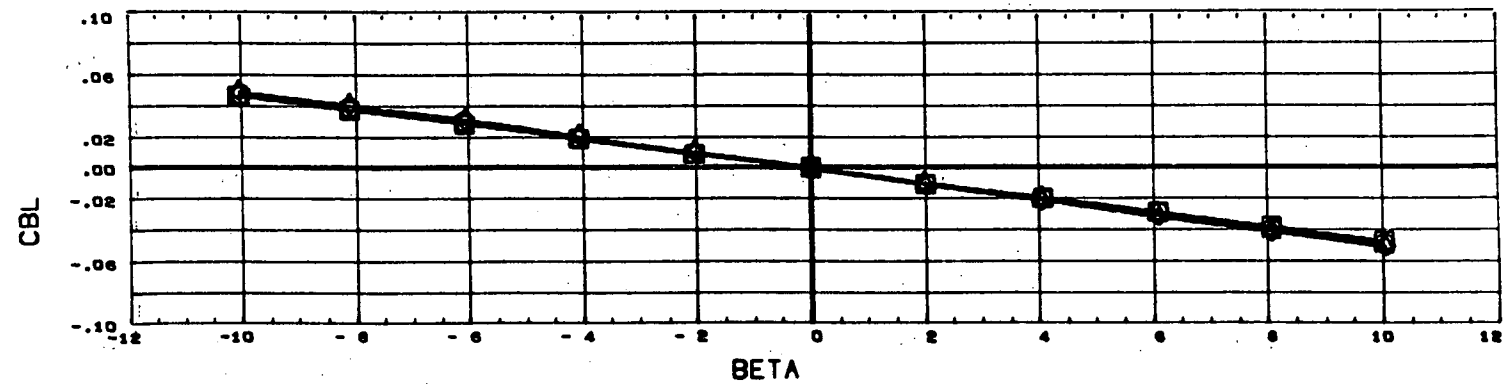
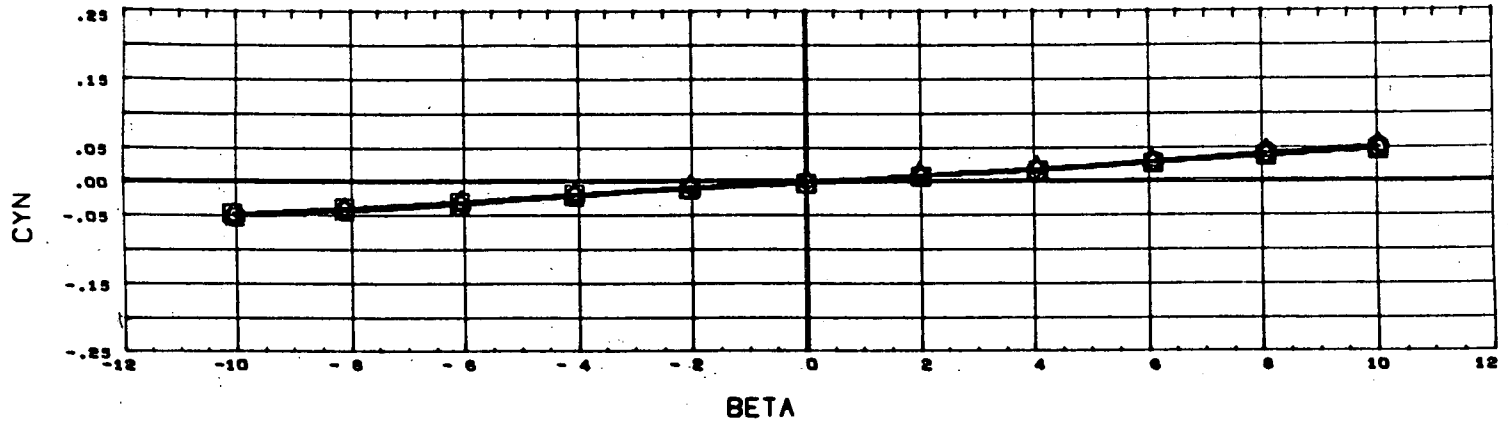
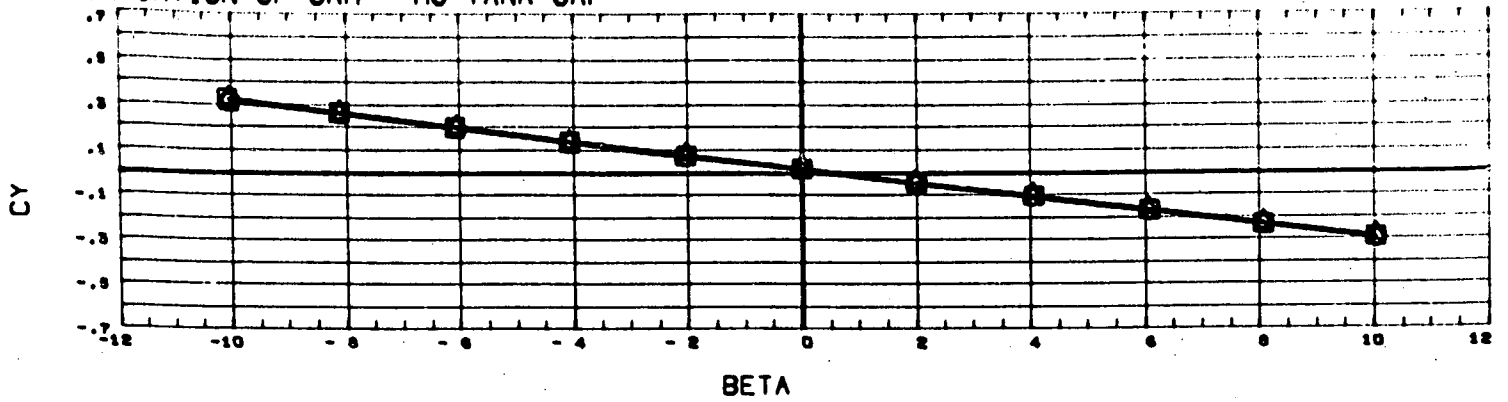
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71105) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71107) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

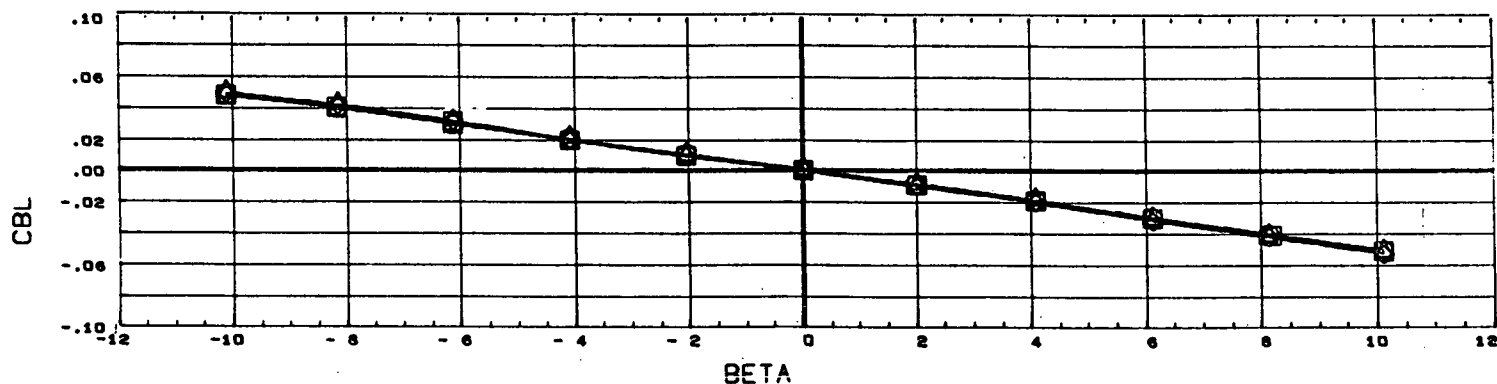
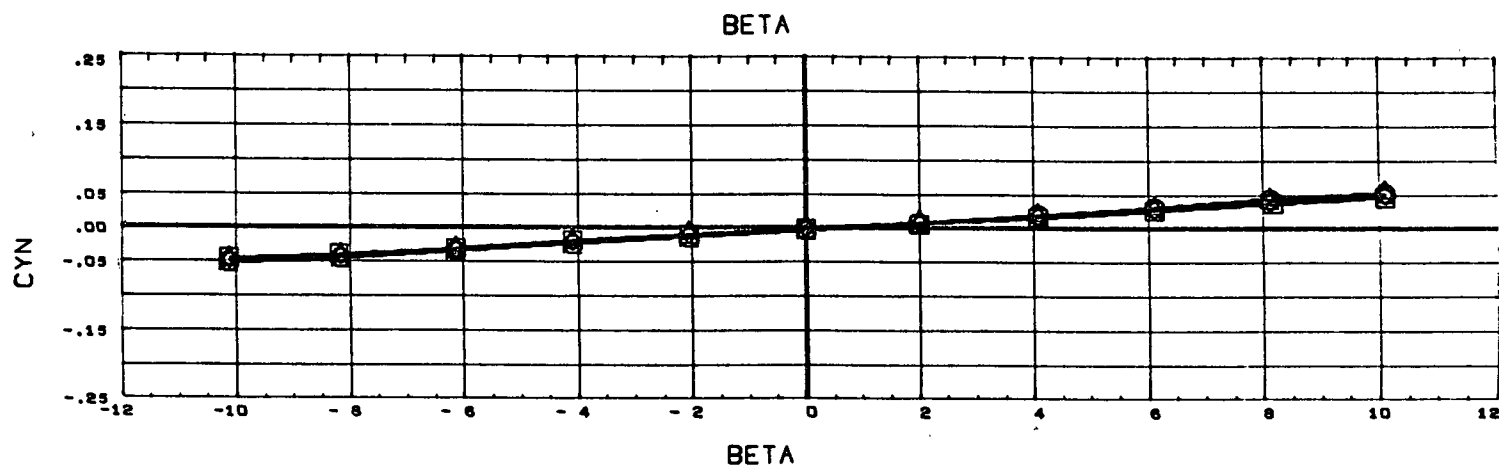
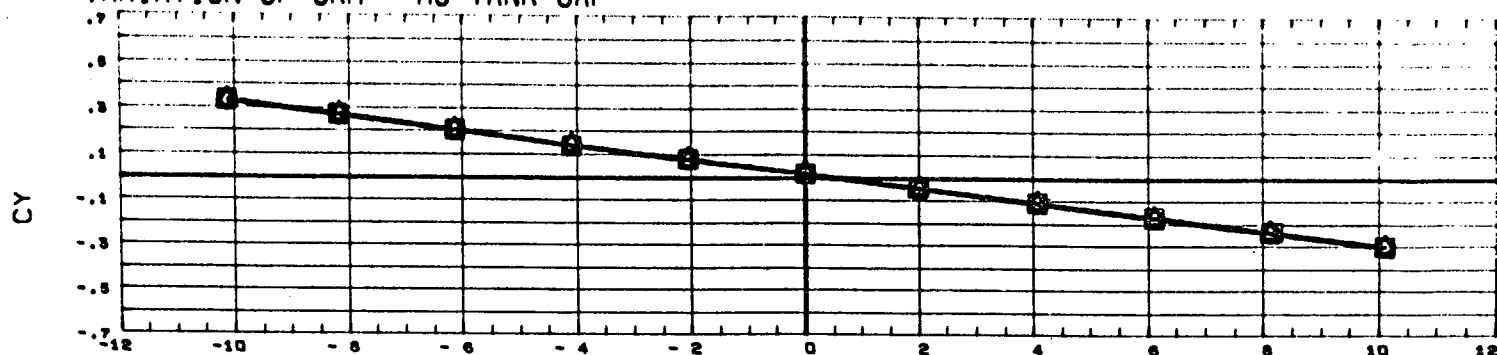
VARIATION OF SRM - HQ TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|--------|
| (A7109U) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 50.1N. |
| (C71106) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (C71108) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4800 | IN. |
| (C71110) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH .60

VARIATION OF SRM - H0 TANK GAP

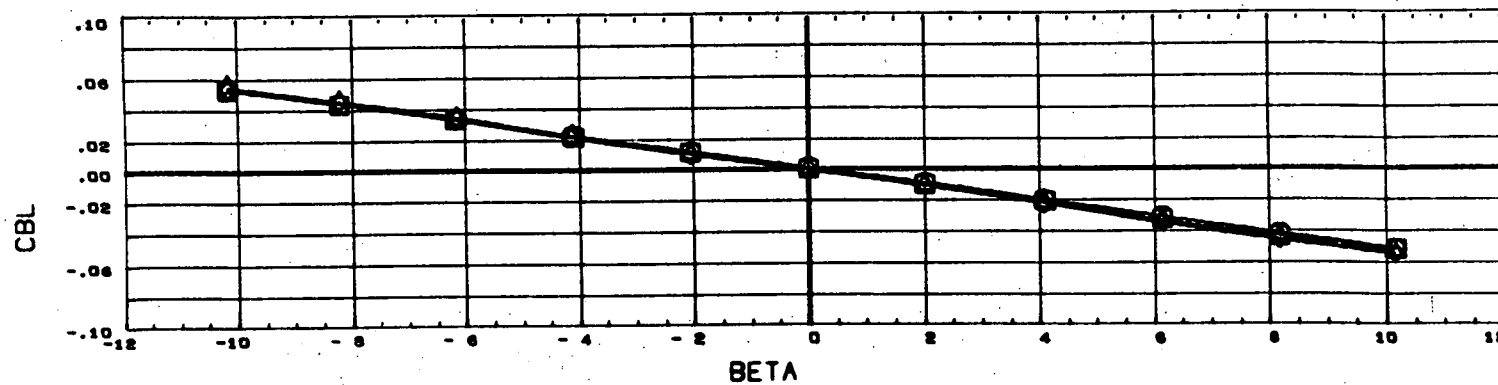
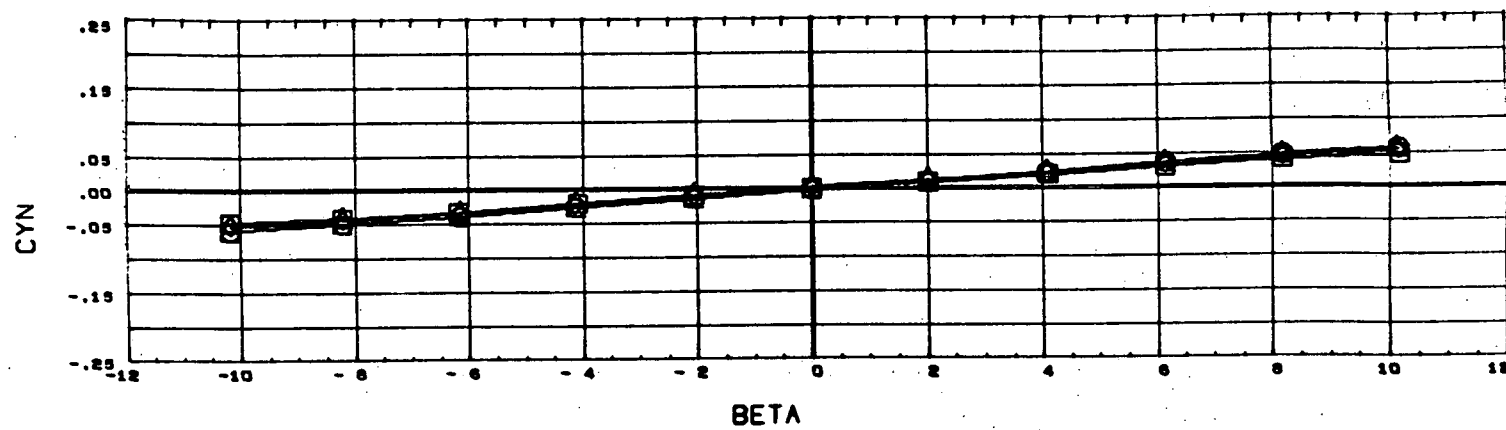
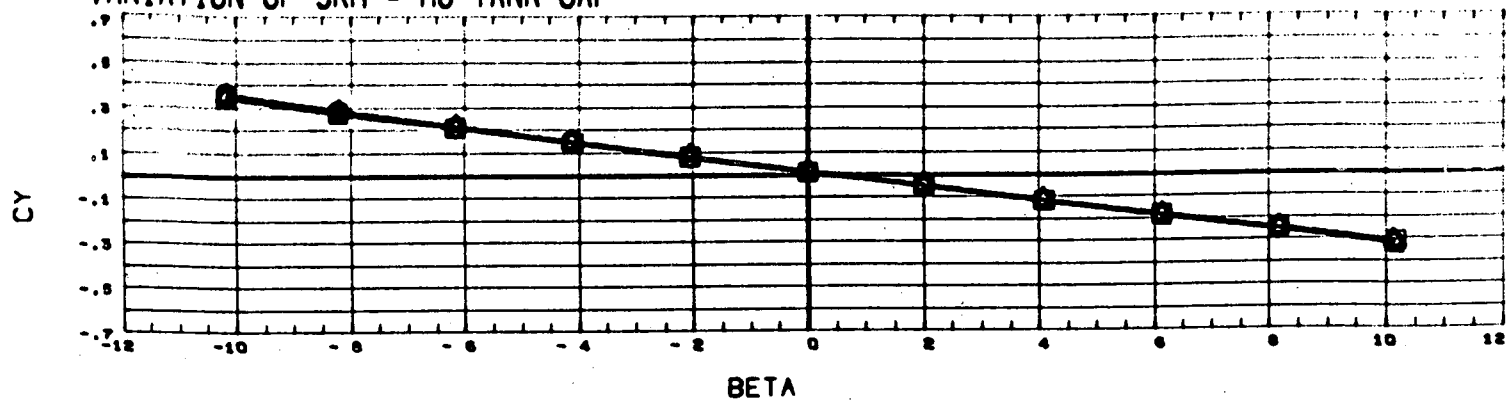


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ.IN. |
| (C71106) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (C71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (C71110) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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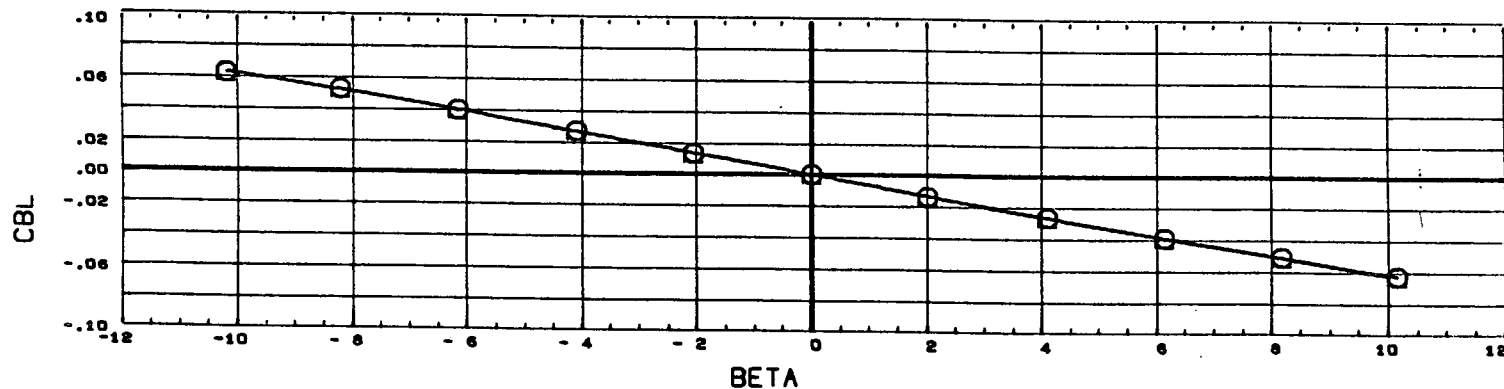
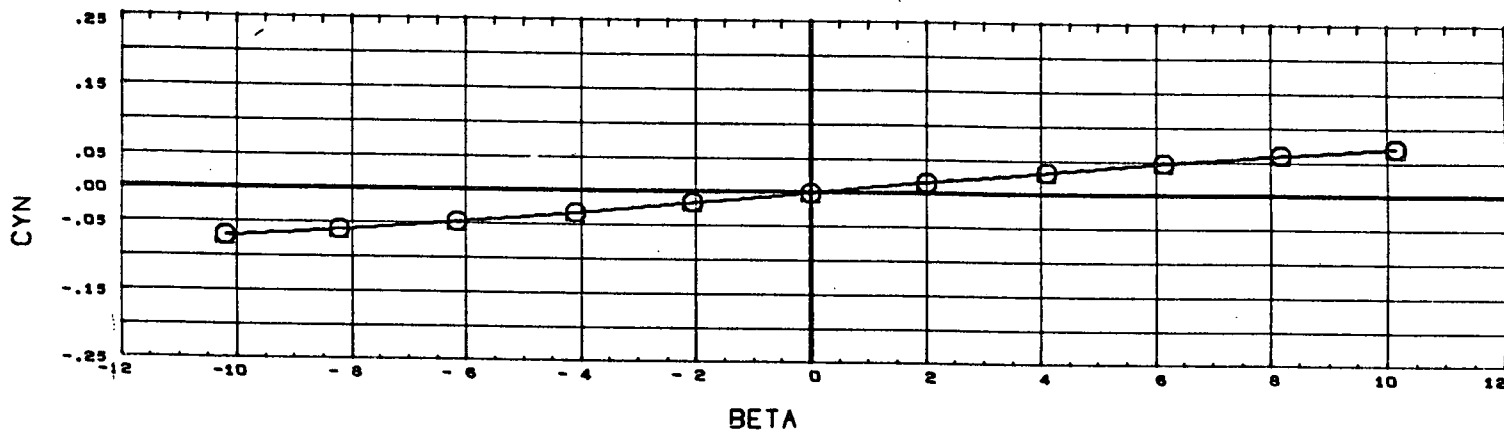
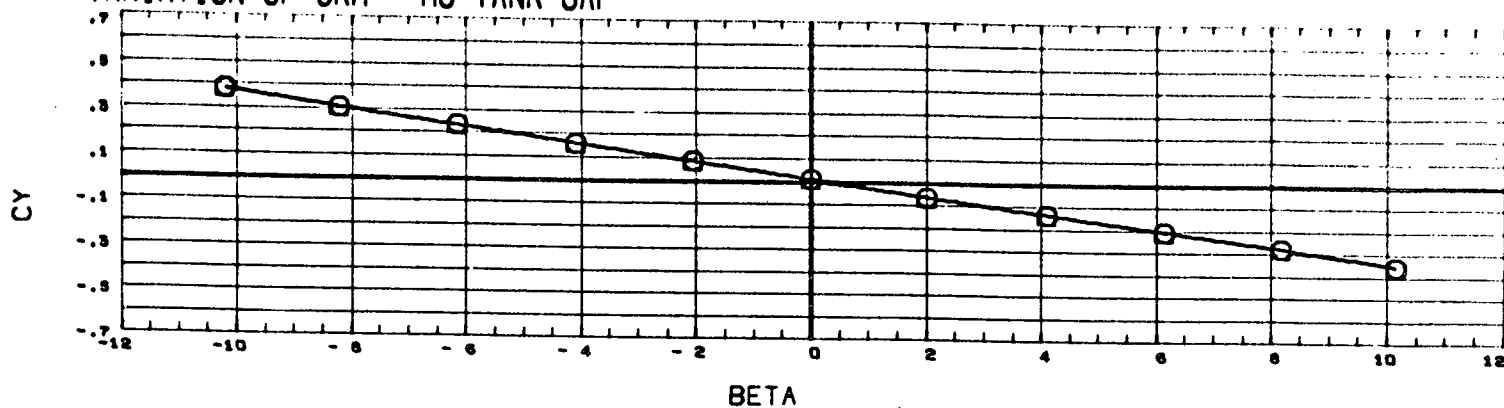
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 50. IN. |
| (C71106) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (C71108) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (C71110) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

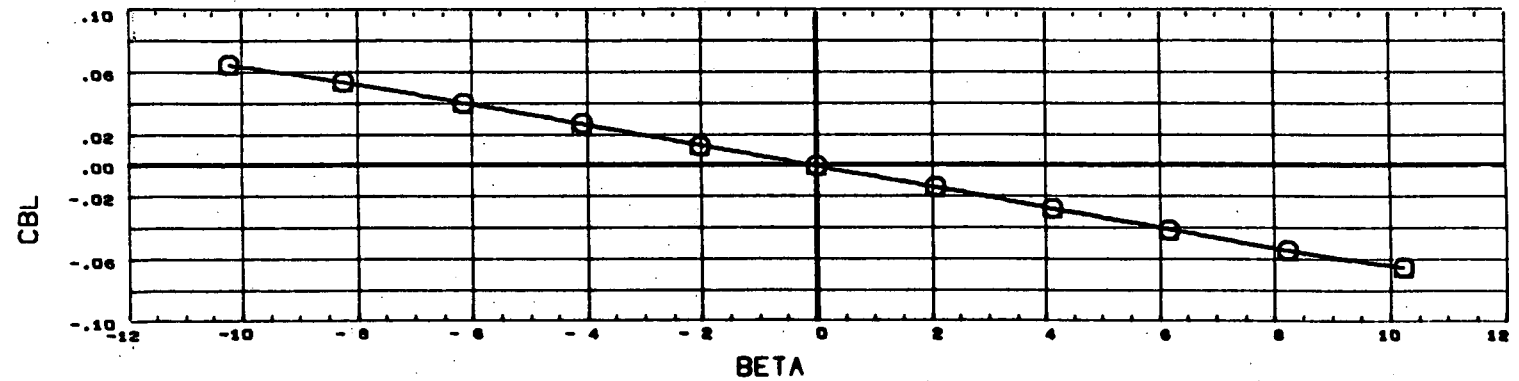
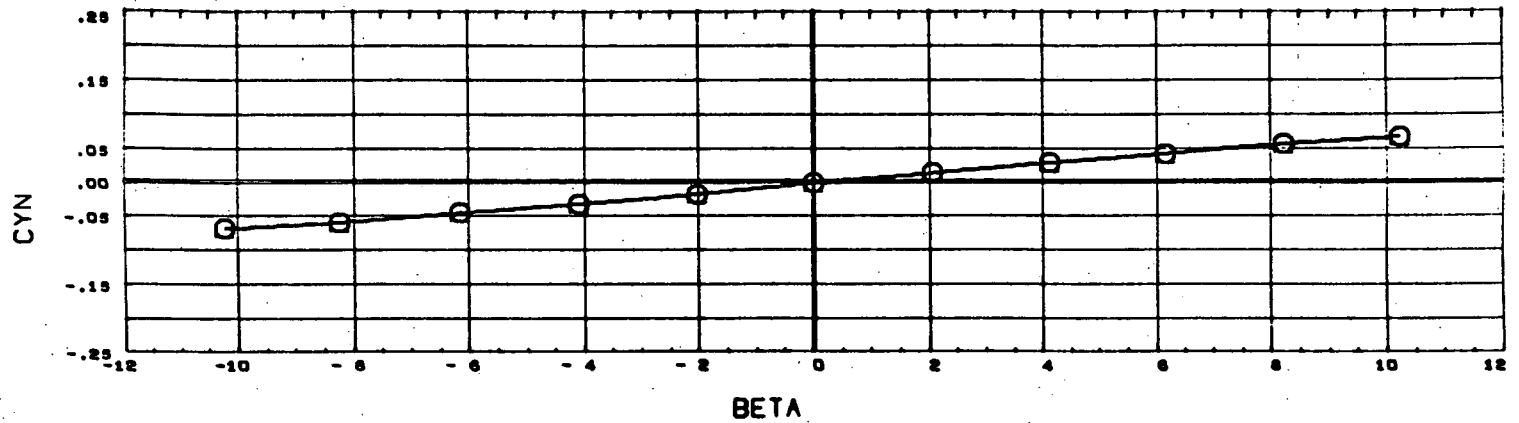
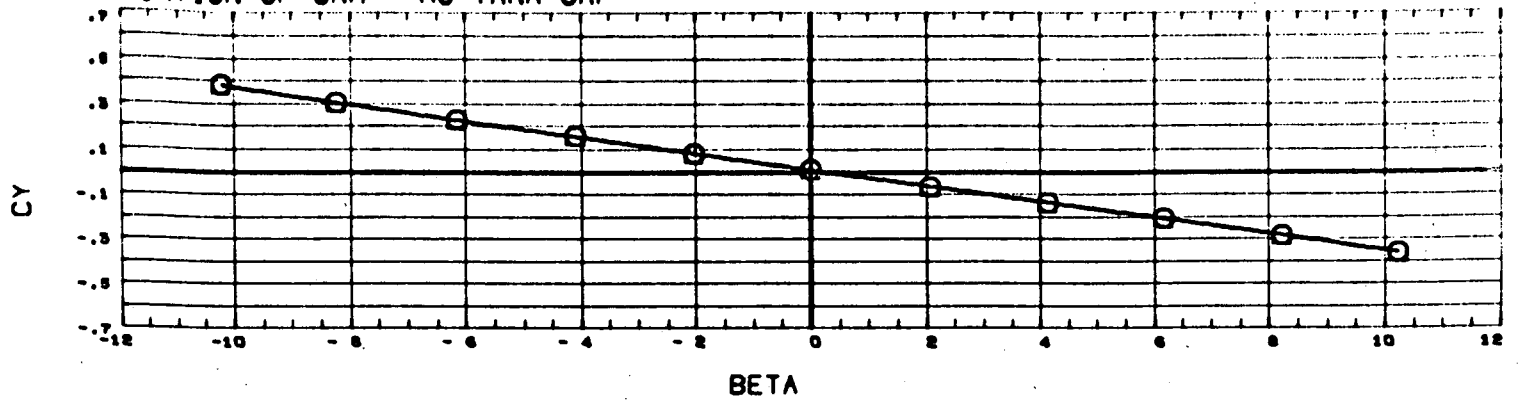
VARIATION OF SRM - HQ TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (C71106) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (C71108) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (C71110) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

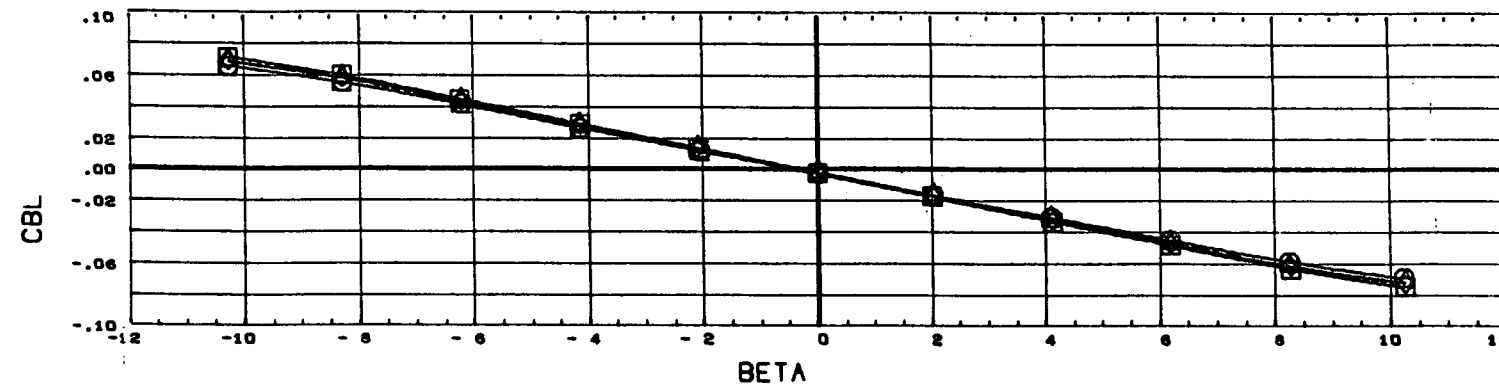
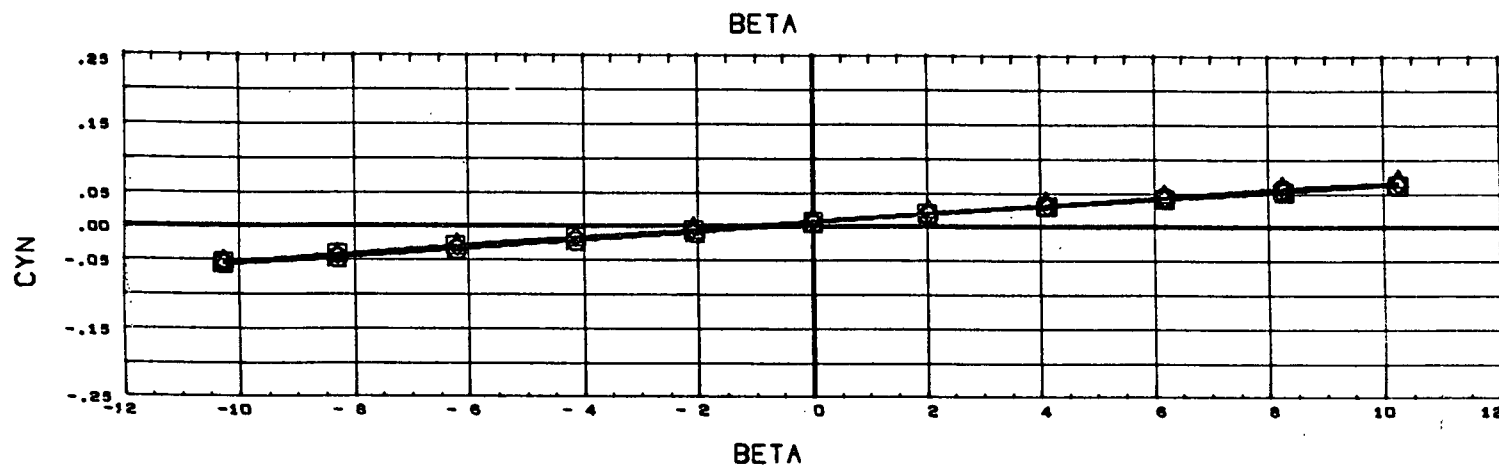
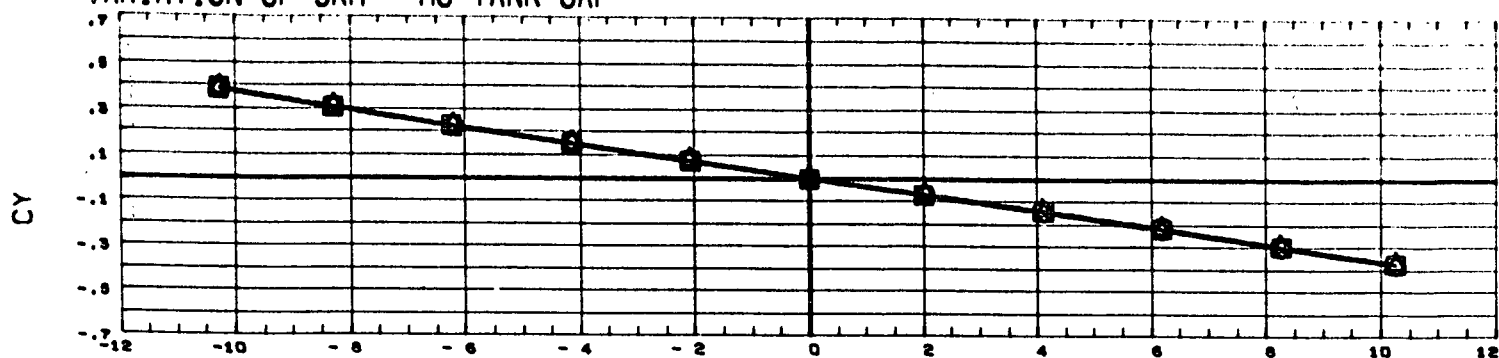
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (C71106) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (C71108) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (C71110) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

VARIATION OF SRM - HQ TANK GAP

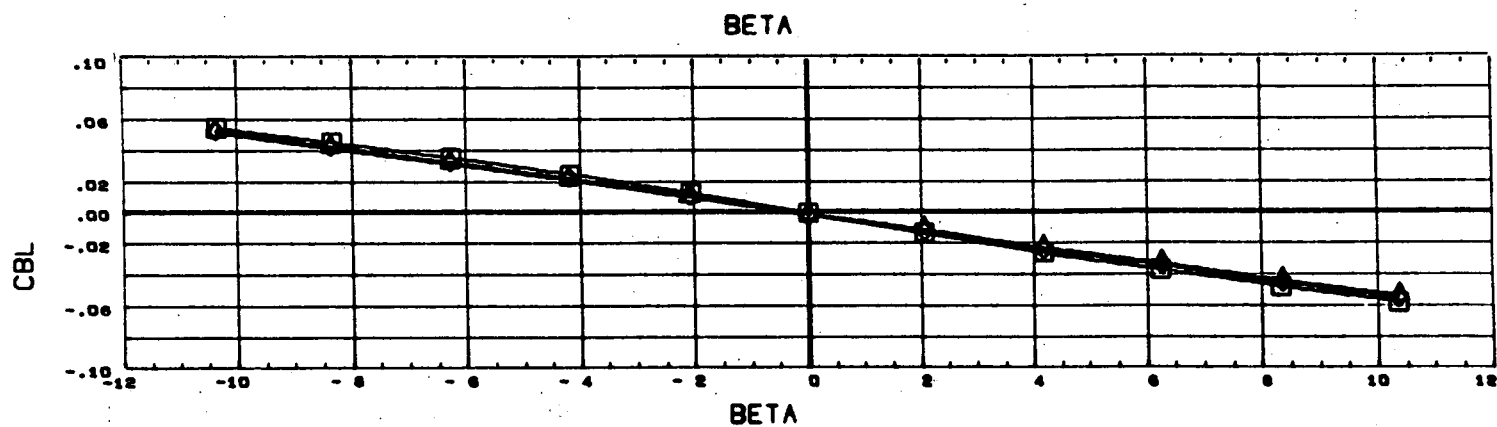
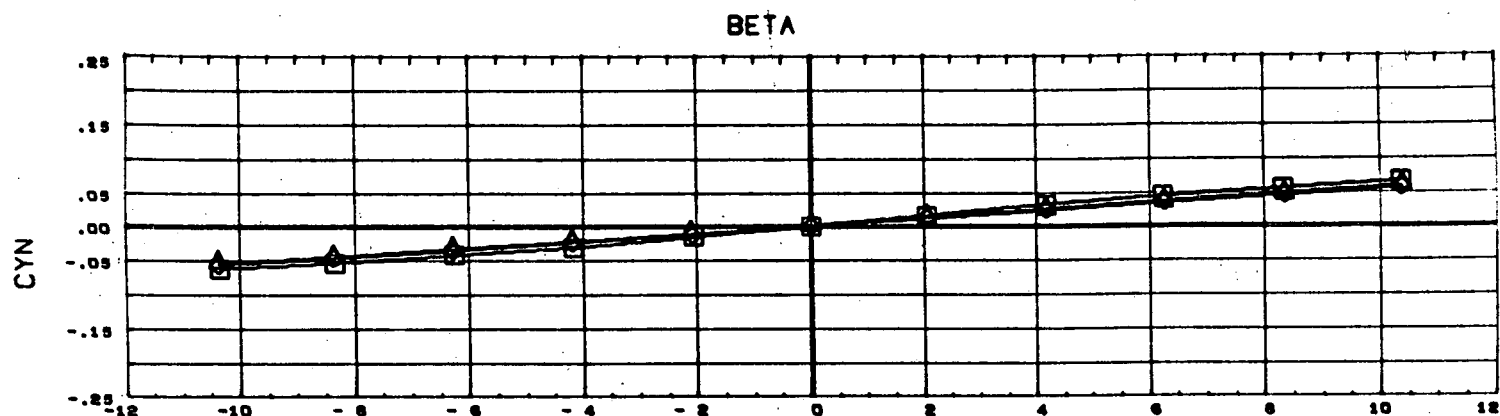
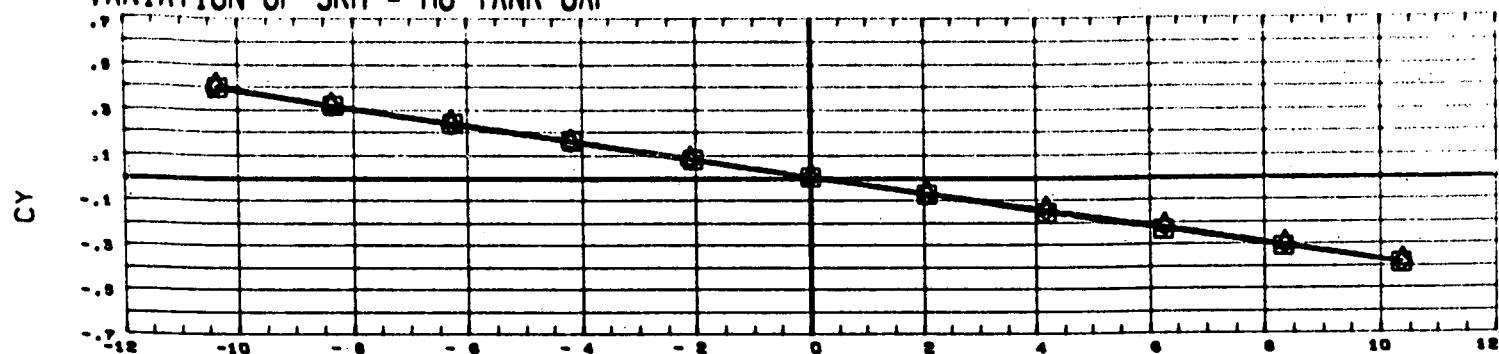


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (C71106) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (C71109) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (C71110) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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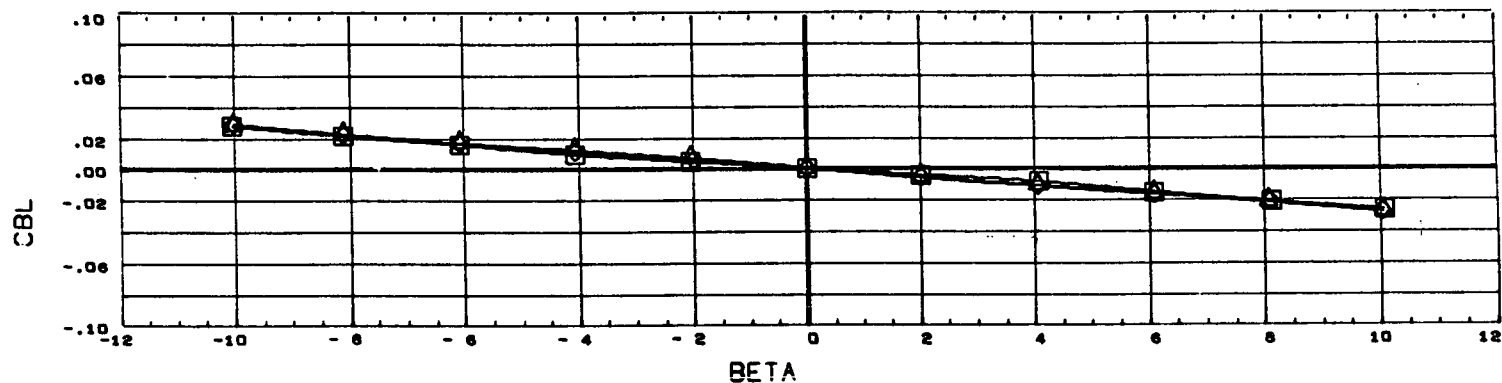
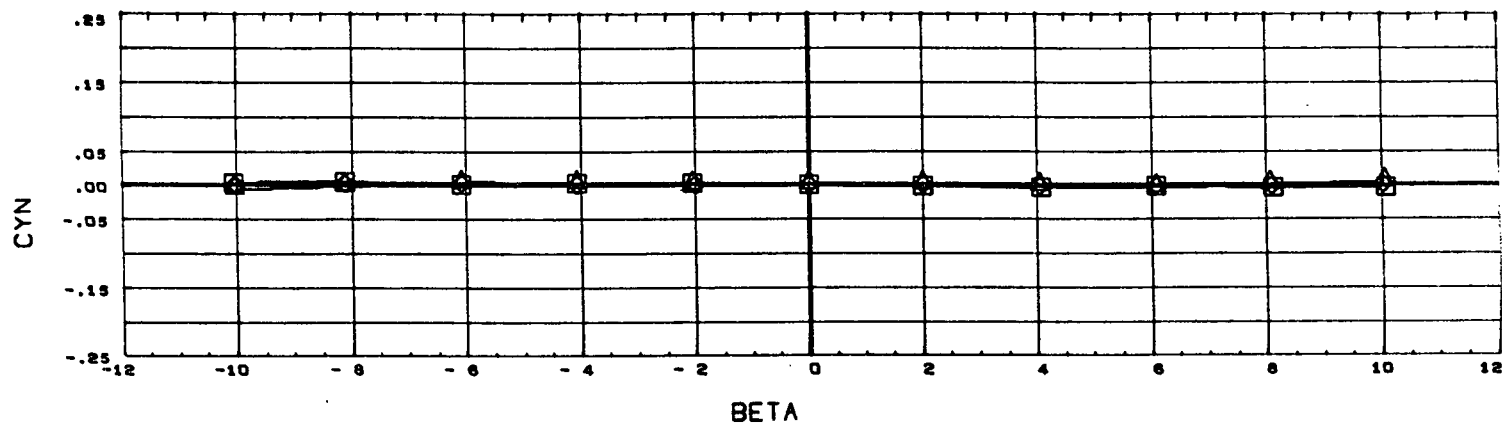
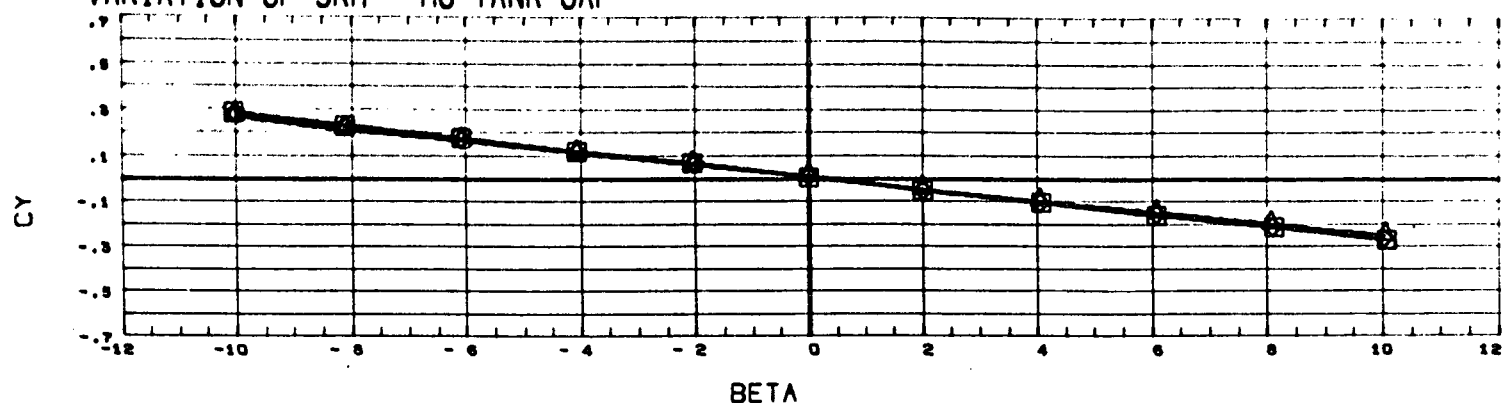
VARIATION OF SRM - HO TANK GAP



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y3 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30.IN. |
| (C71106) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (C71108) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (C71110) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

VARIATION OF SRM - HO TANK GAP



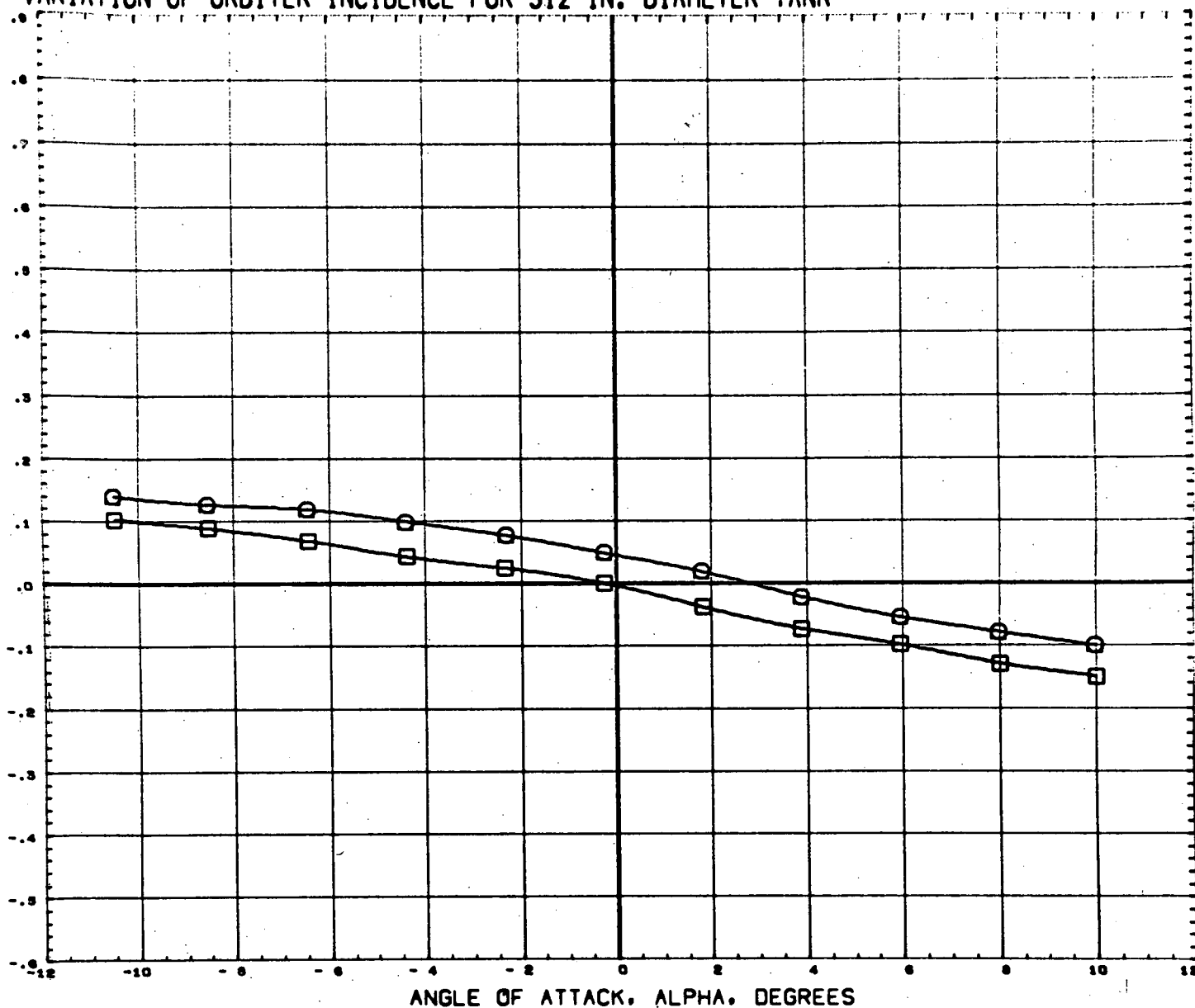
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (C71106) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.073 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (C71108) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.123 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (C71110) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.223 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

PITCHING MOMENT COEFFICIENT, CLM

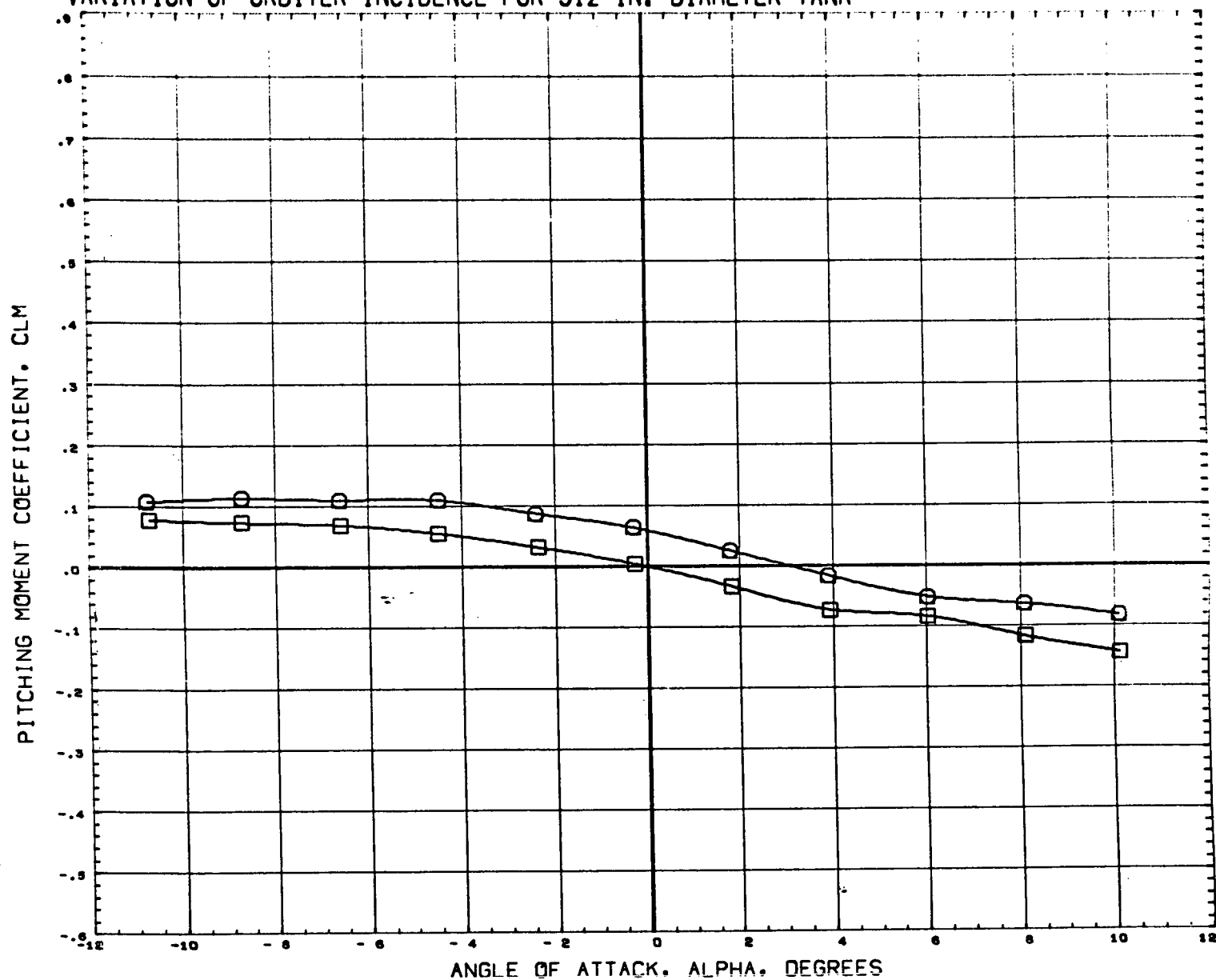


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 30.1N. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

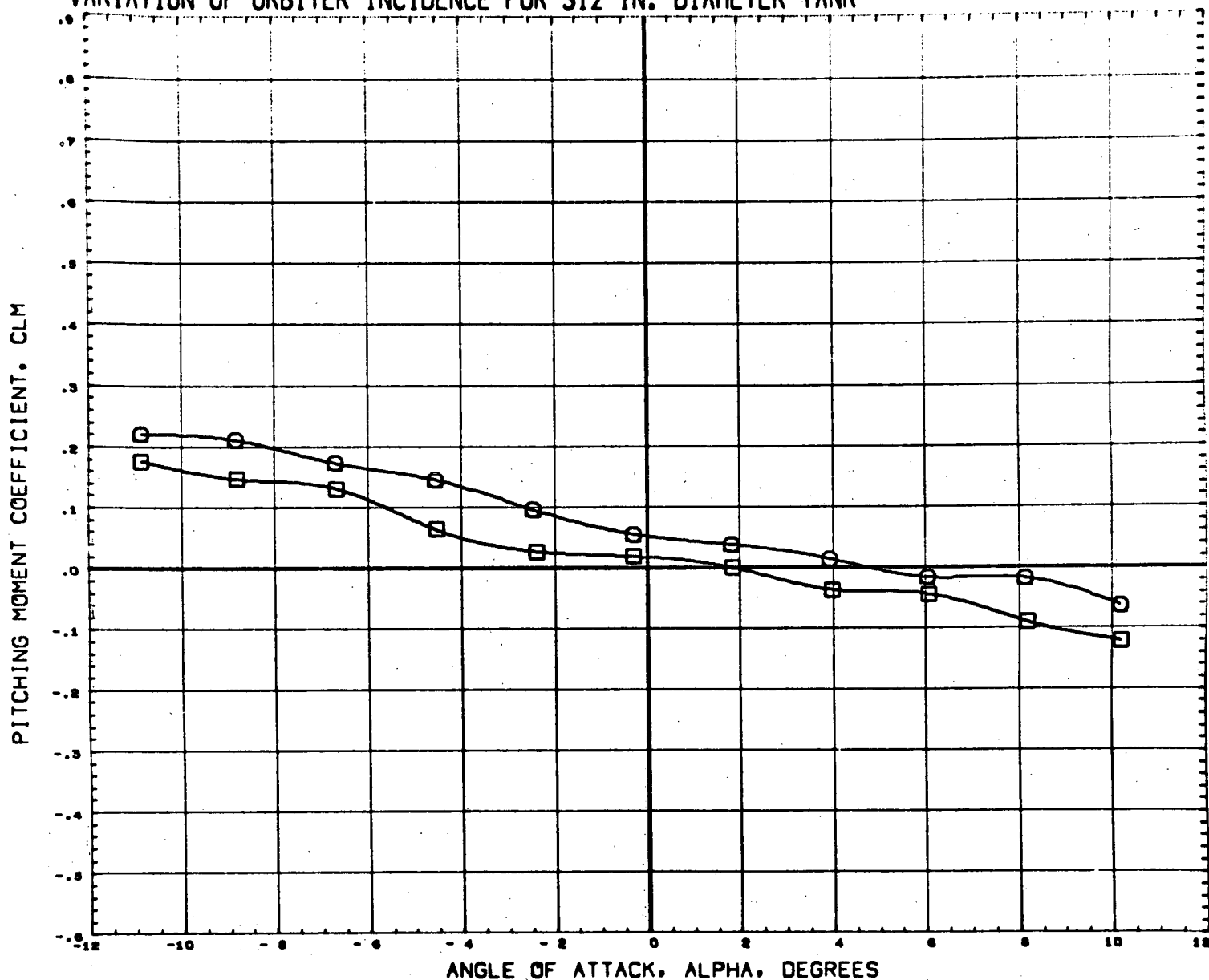


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



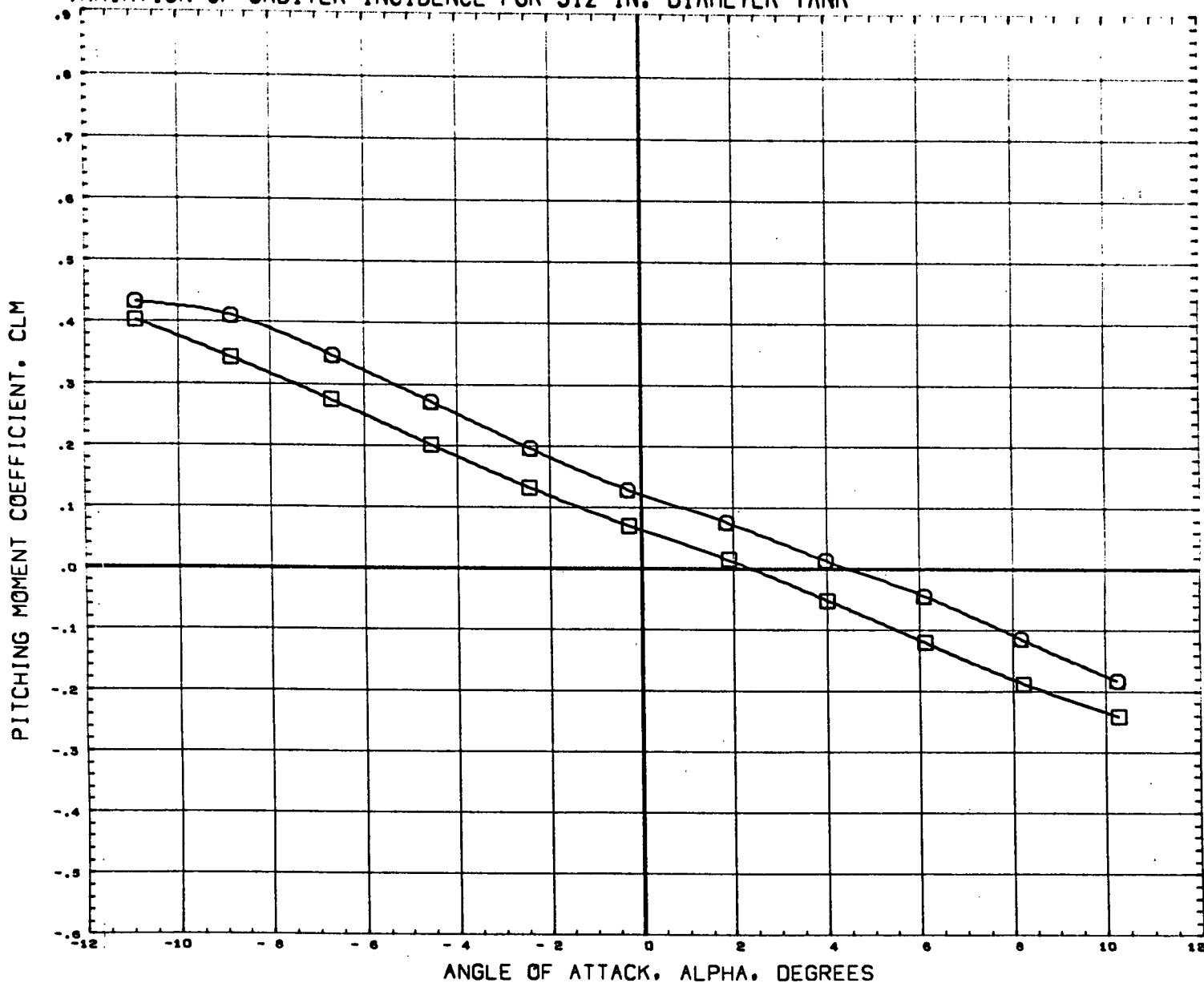
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.91

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

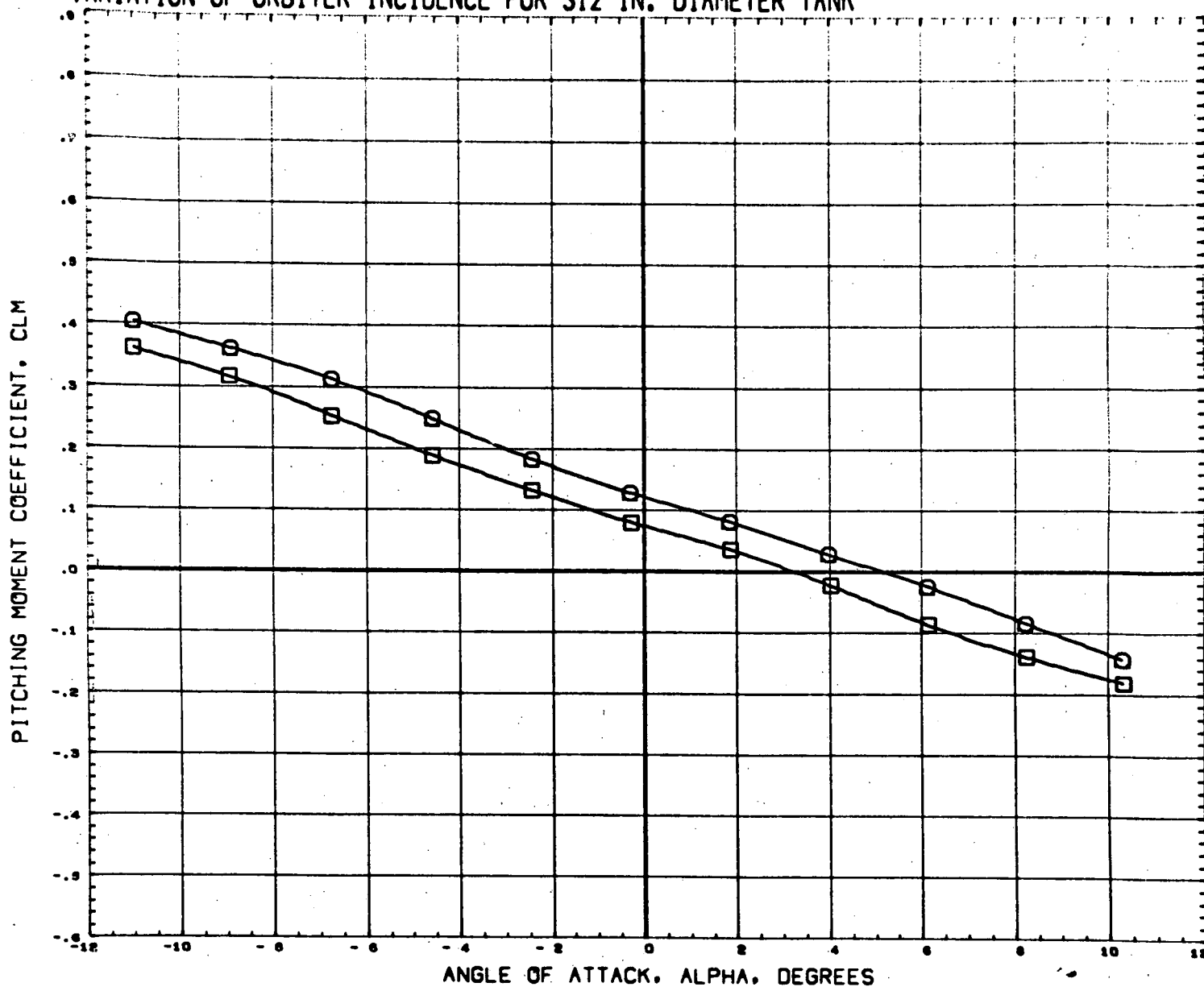


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

PAGE 188

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

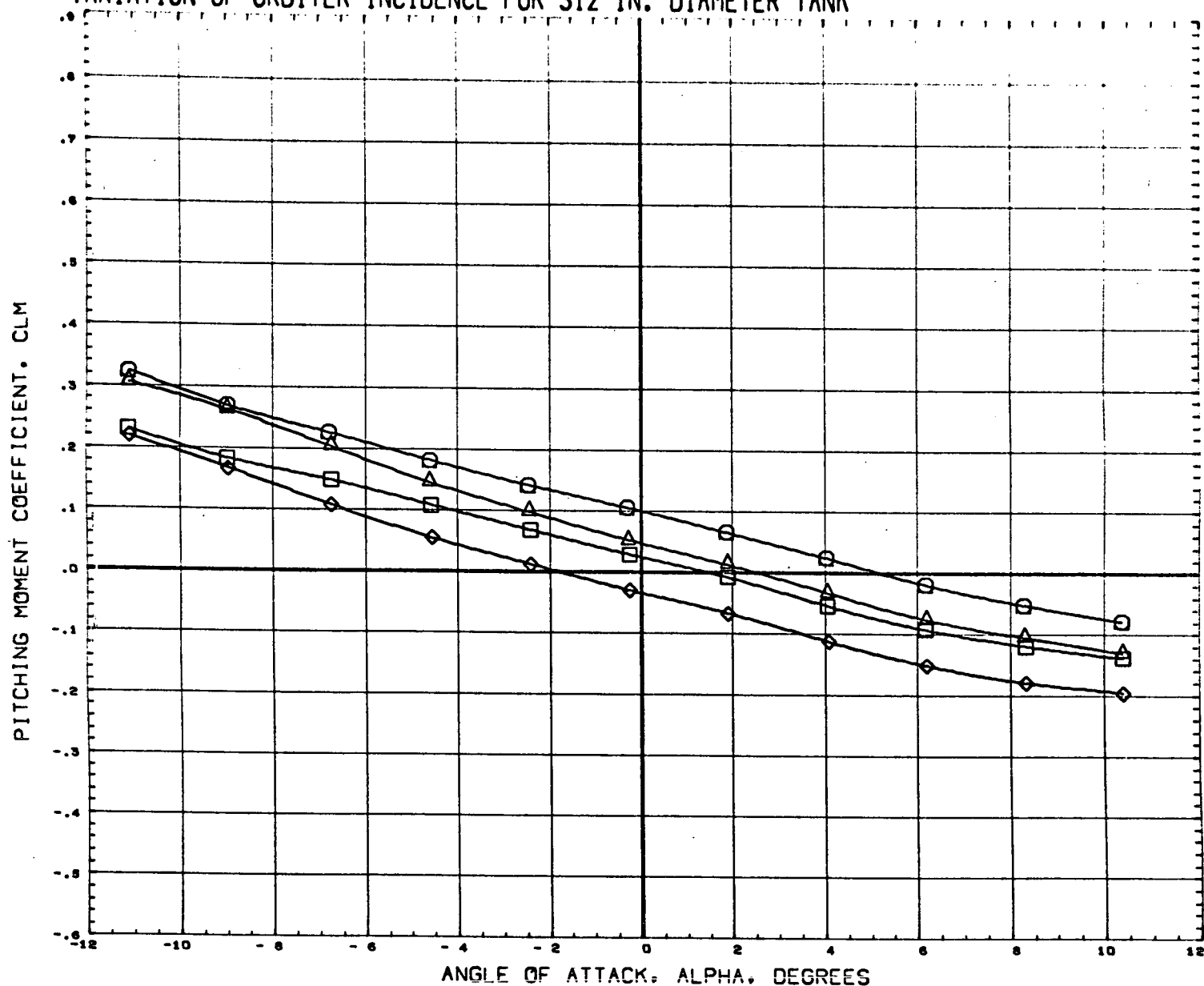


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

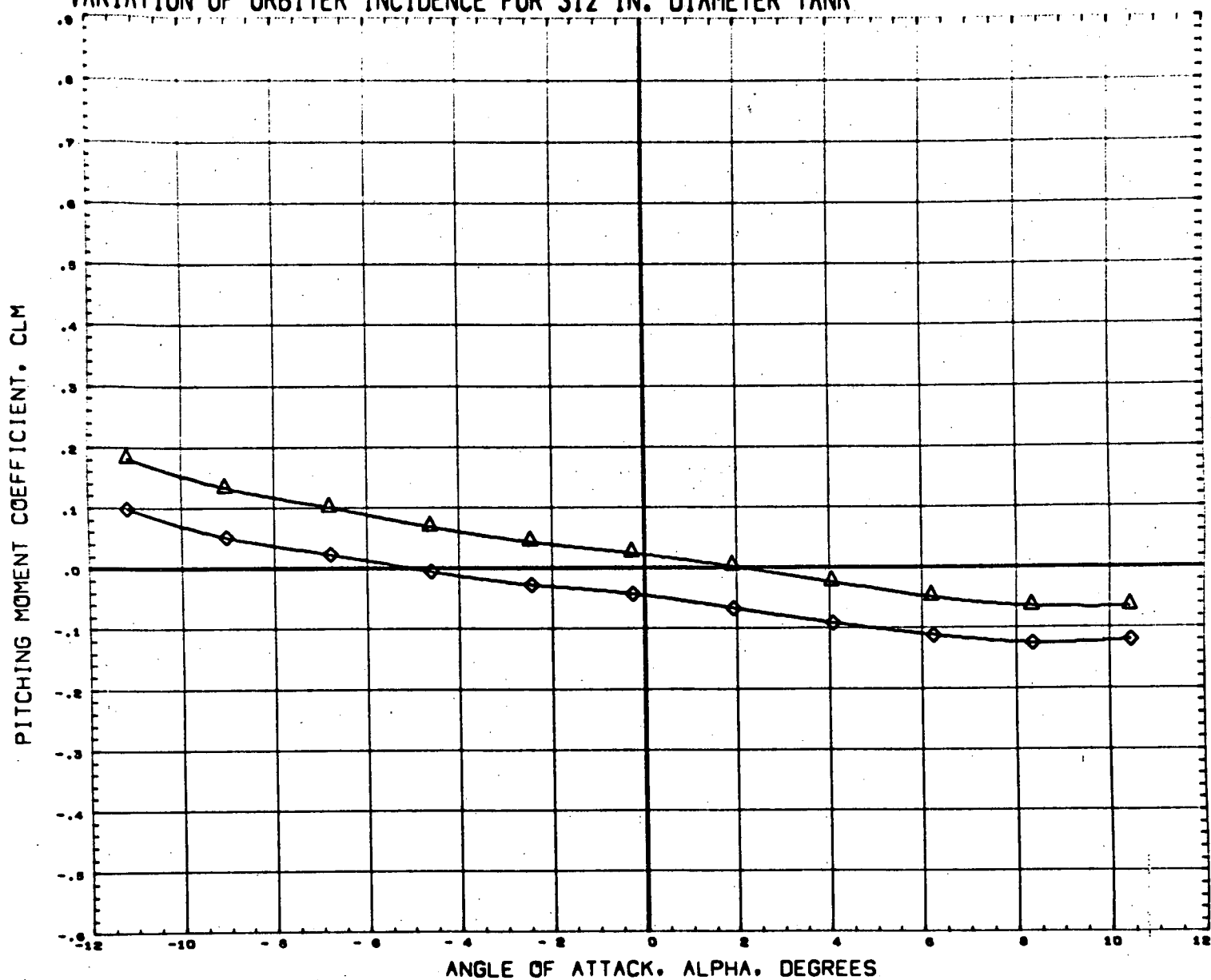


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

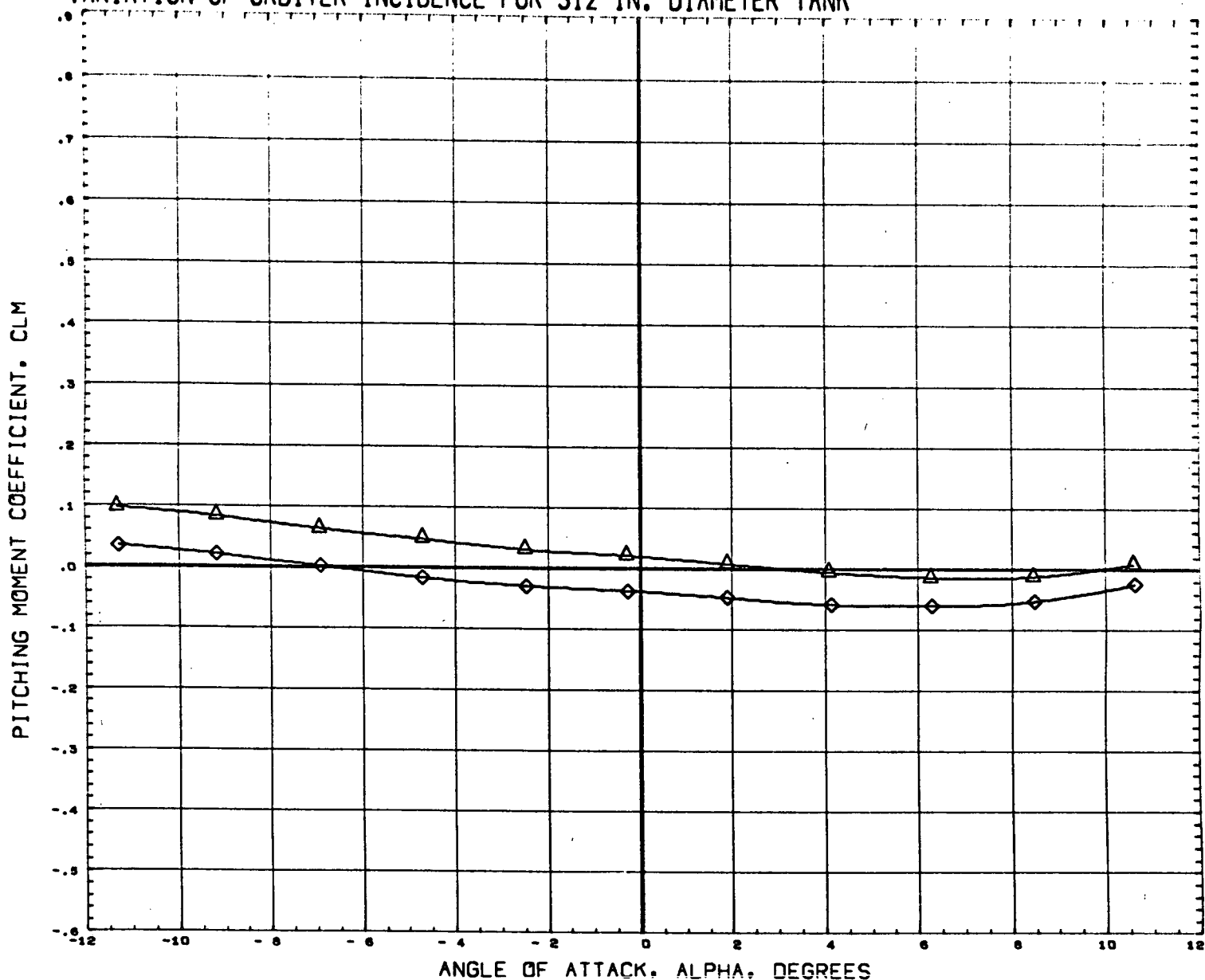


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71131) | NSFC TWT S44X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | NSFC TWT S44X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.47

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

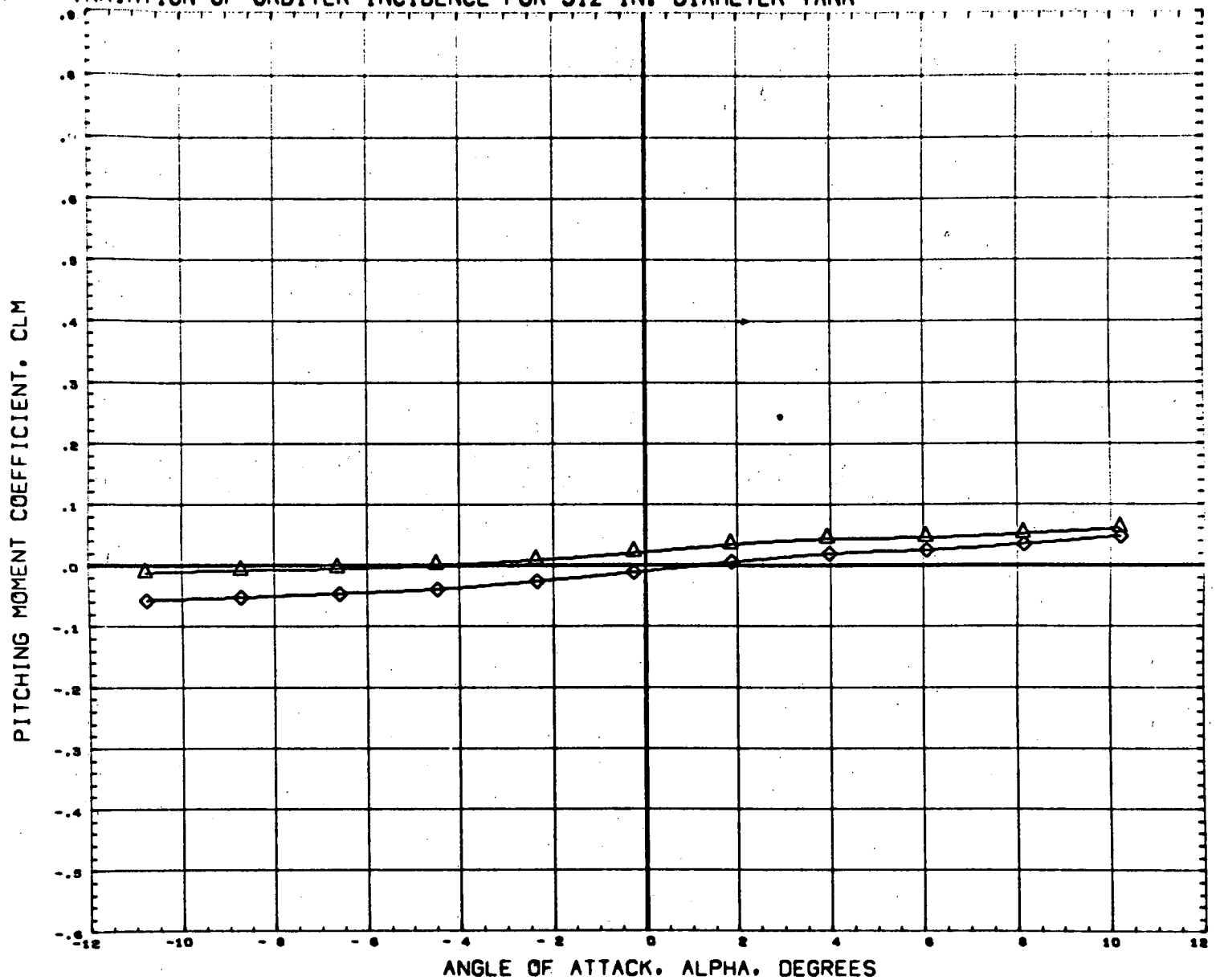


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITAL | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

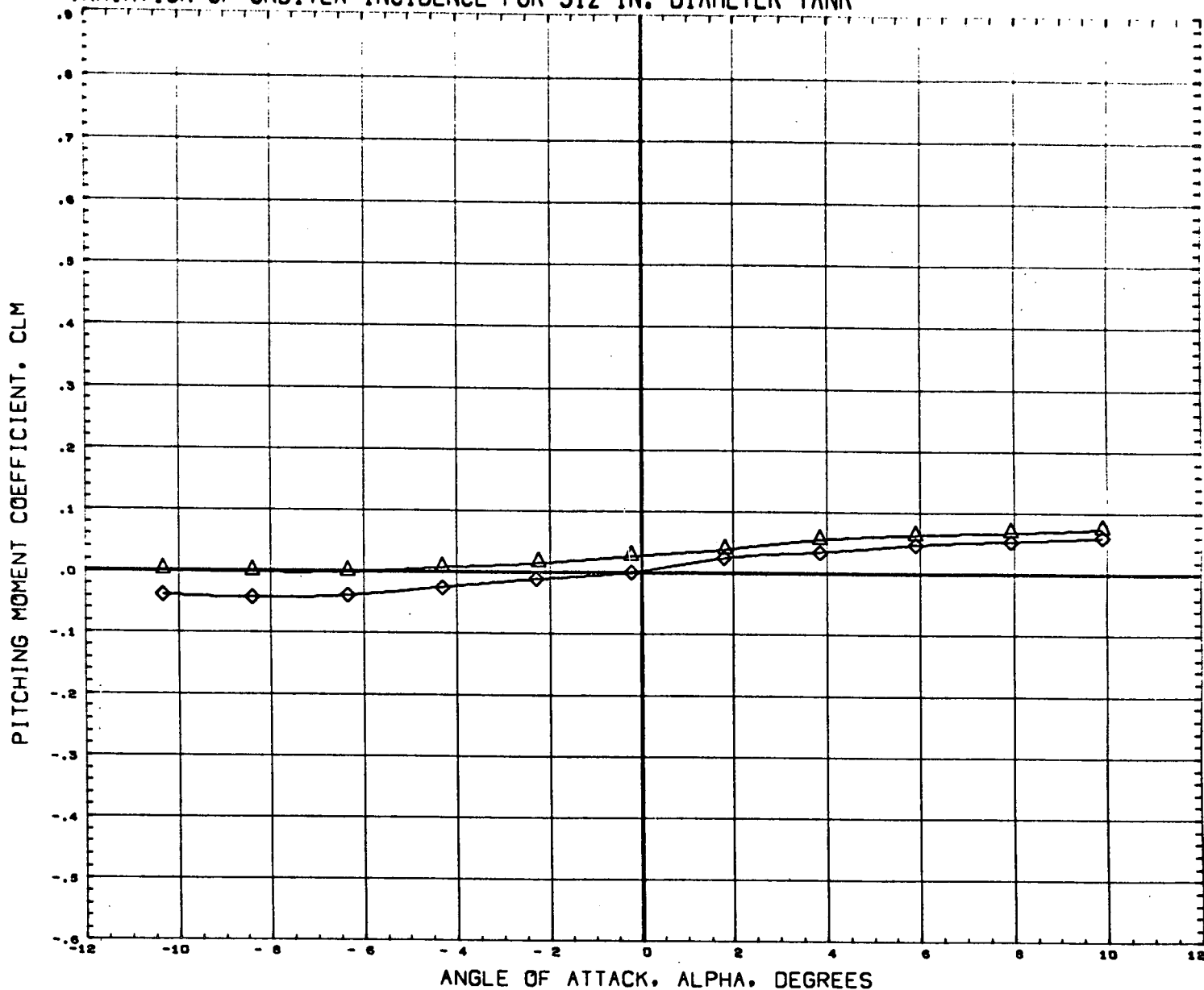


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

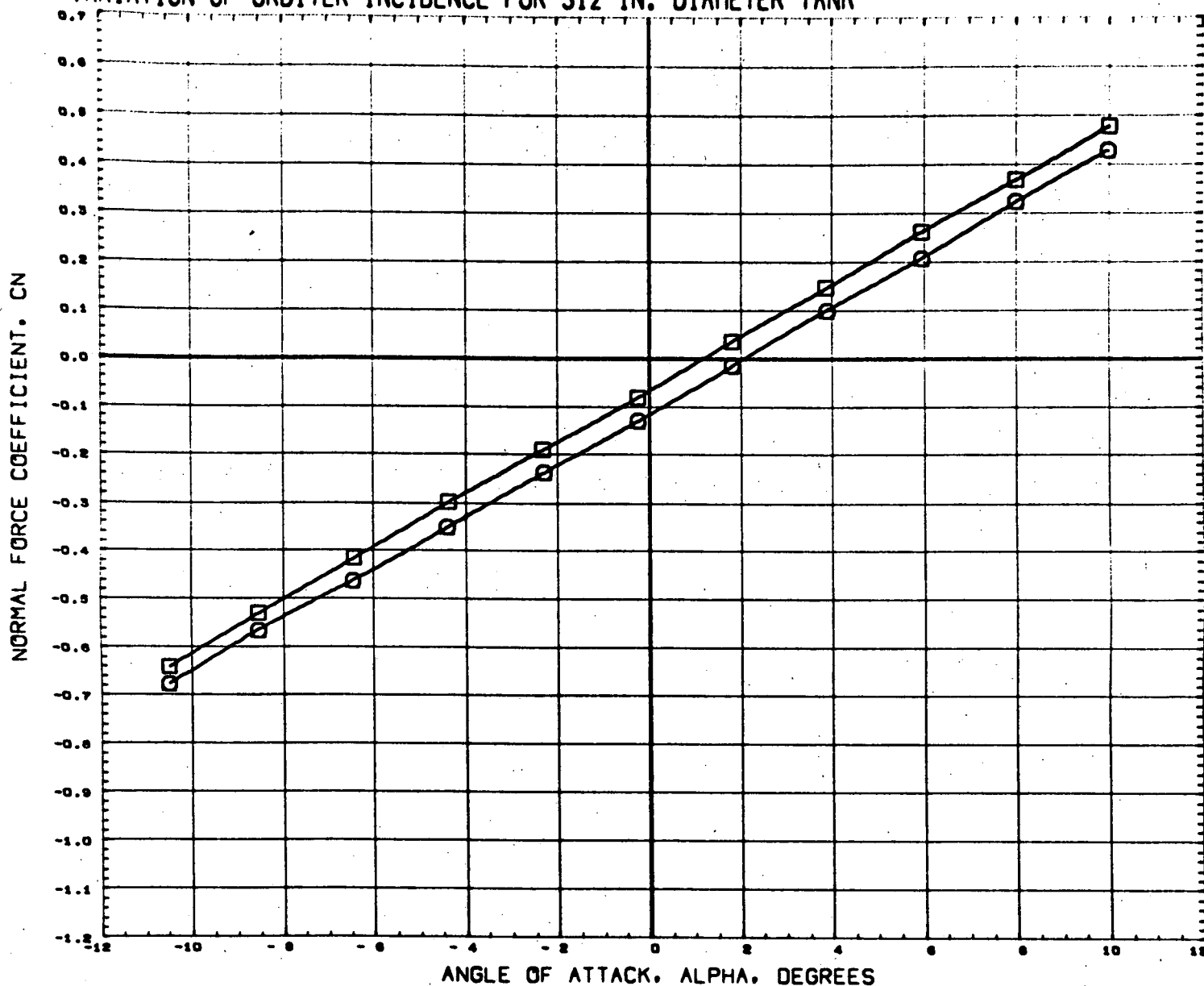


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | GREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

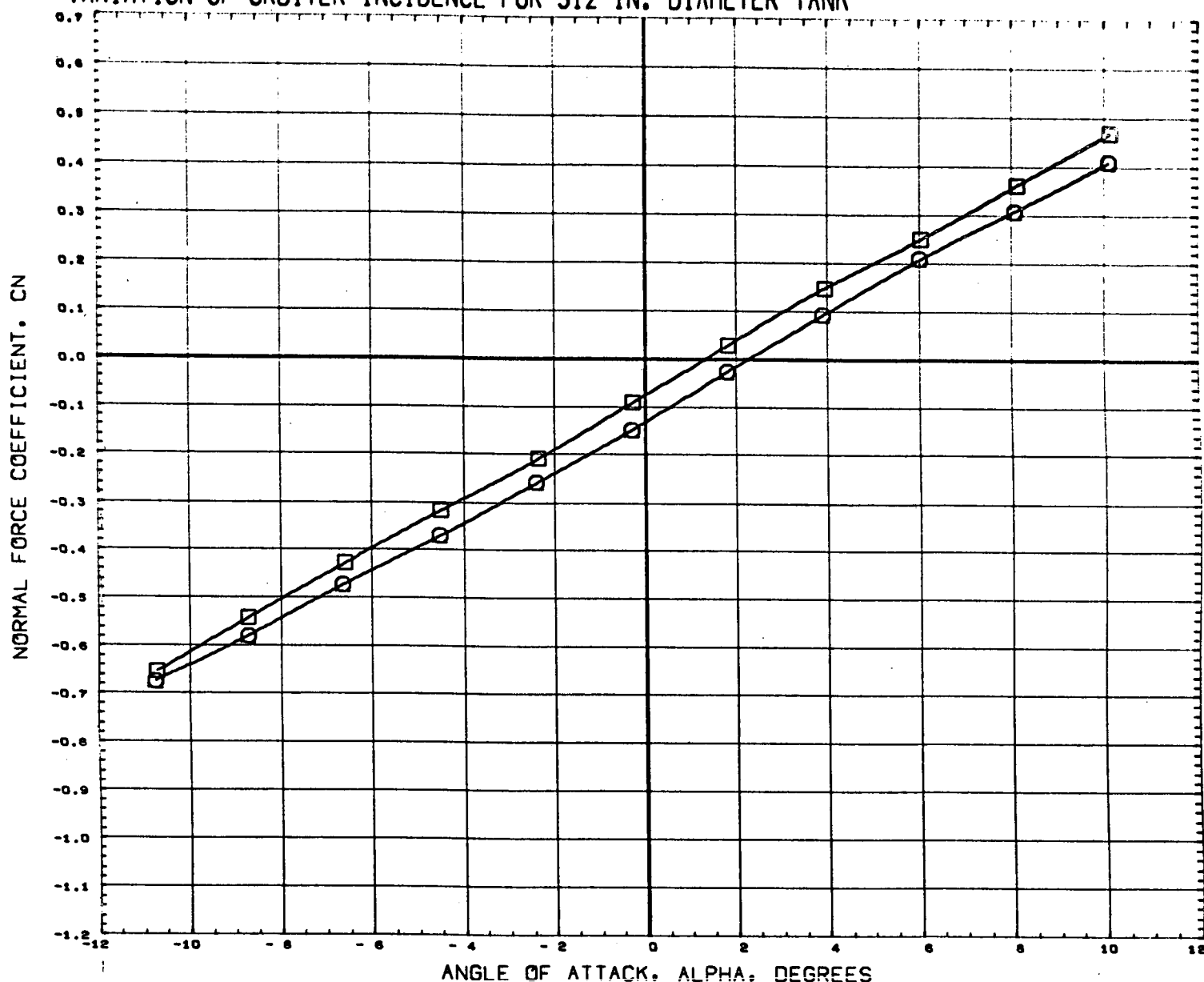


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|---------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30.IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 195

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

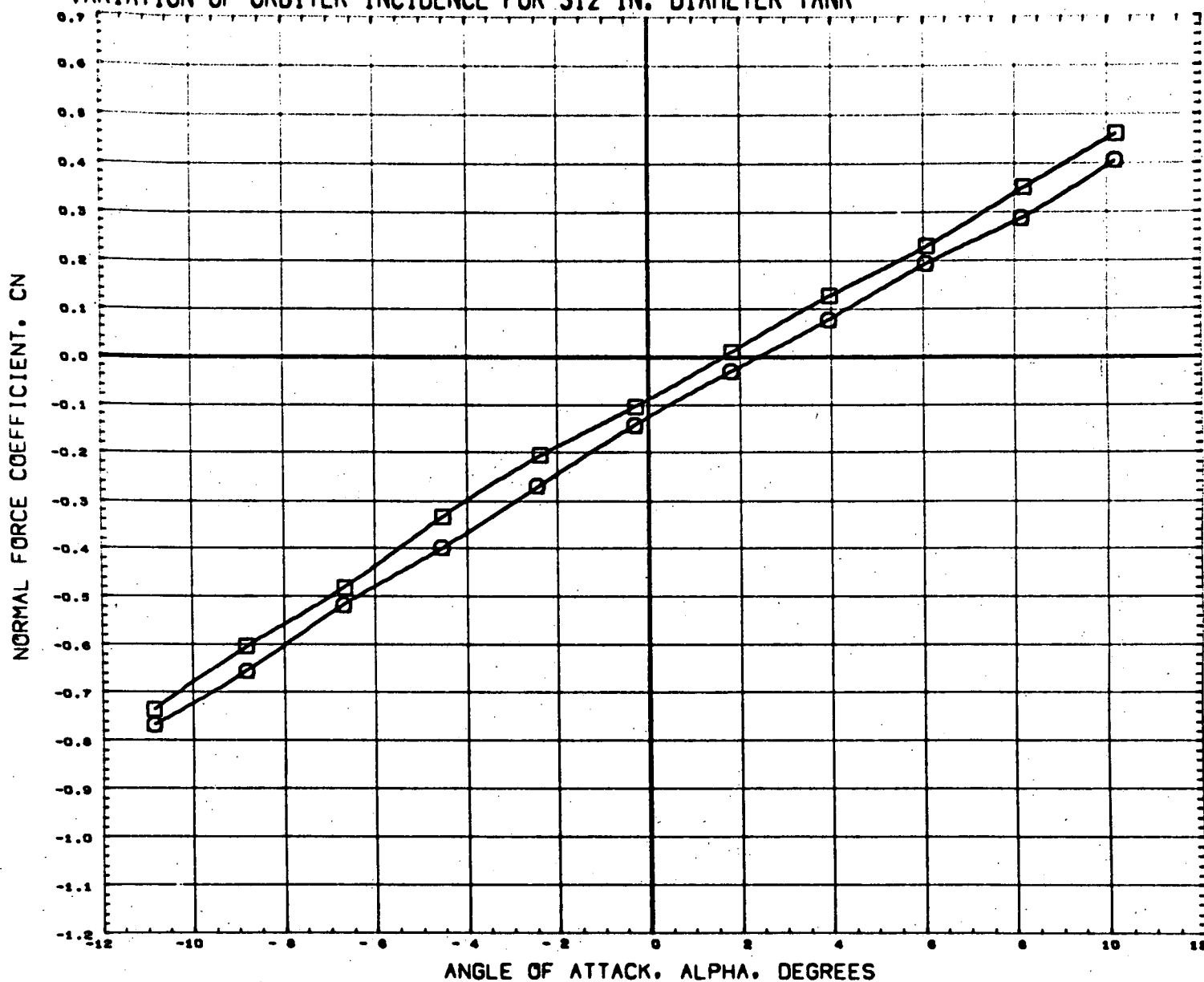


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.9800 SQ. IN. |
| (871131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMPP | 3.3600 IN. |
| | | | | | | YMPP | 0.0000 IN. |
| | | | | | | ZMPP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

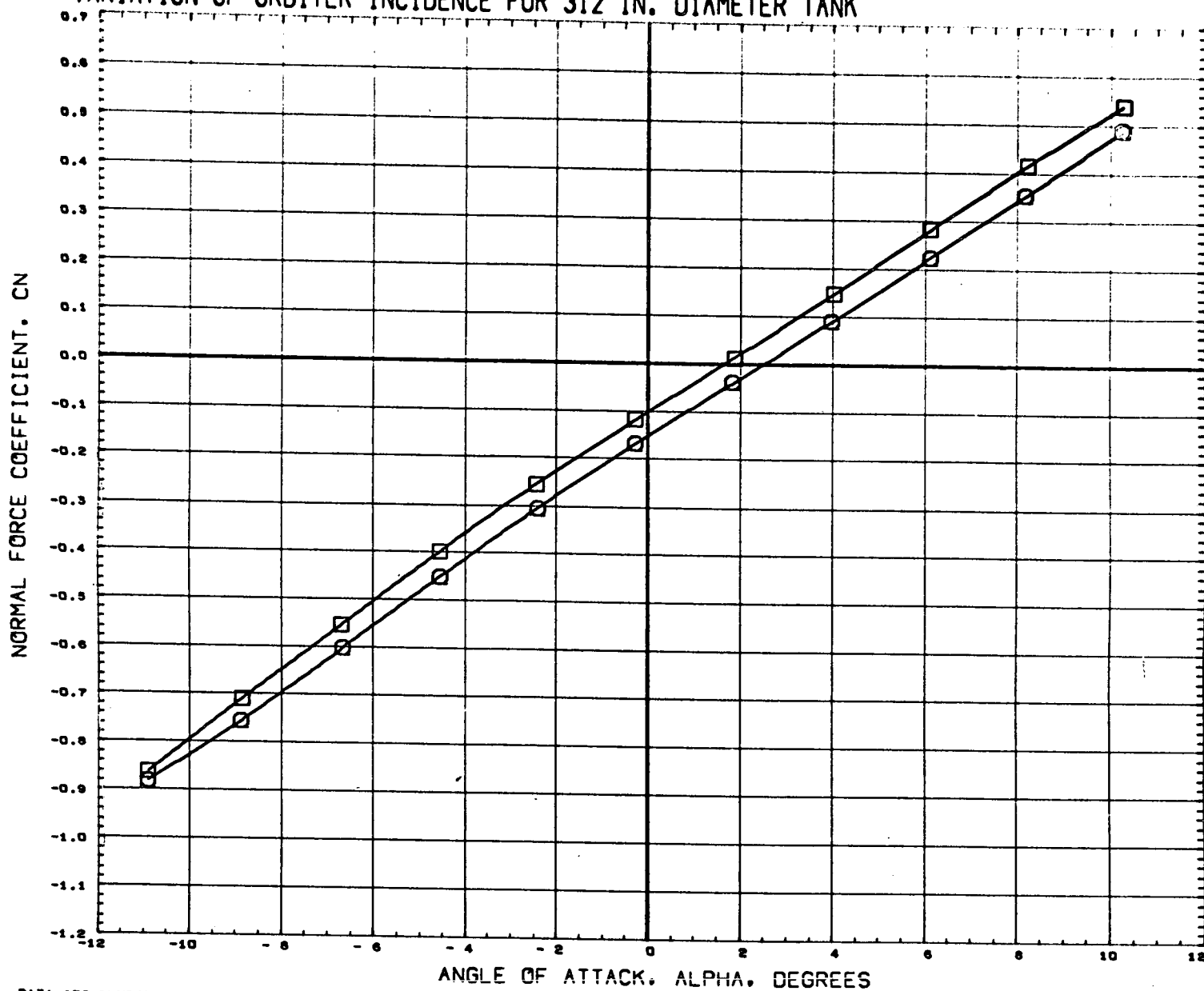


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREP | 7.8600 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREP | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .91

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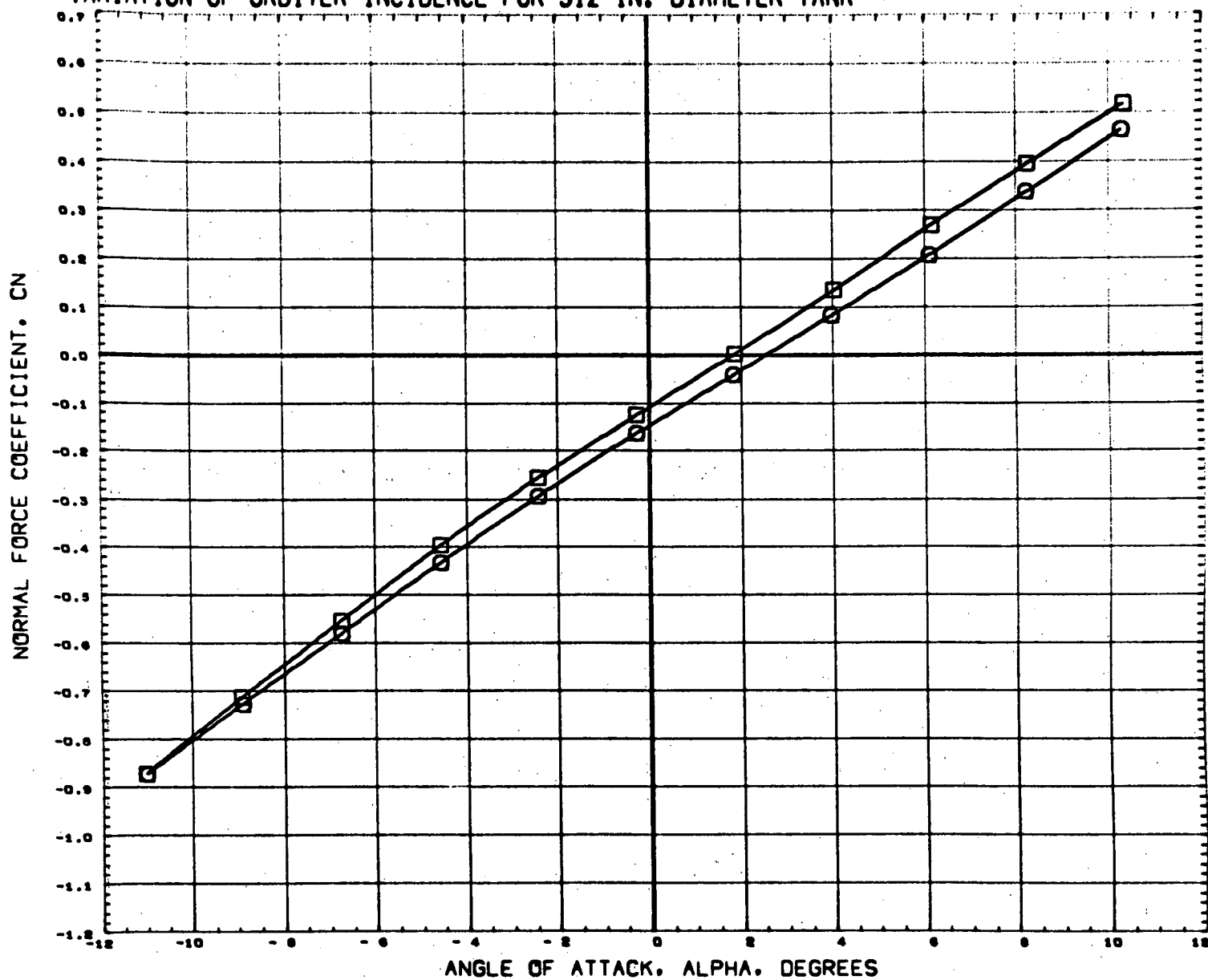
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

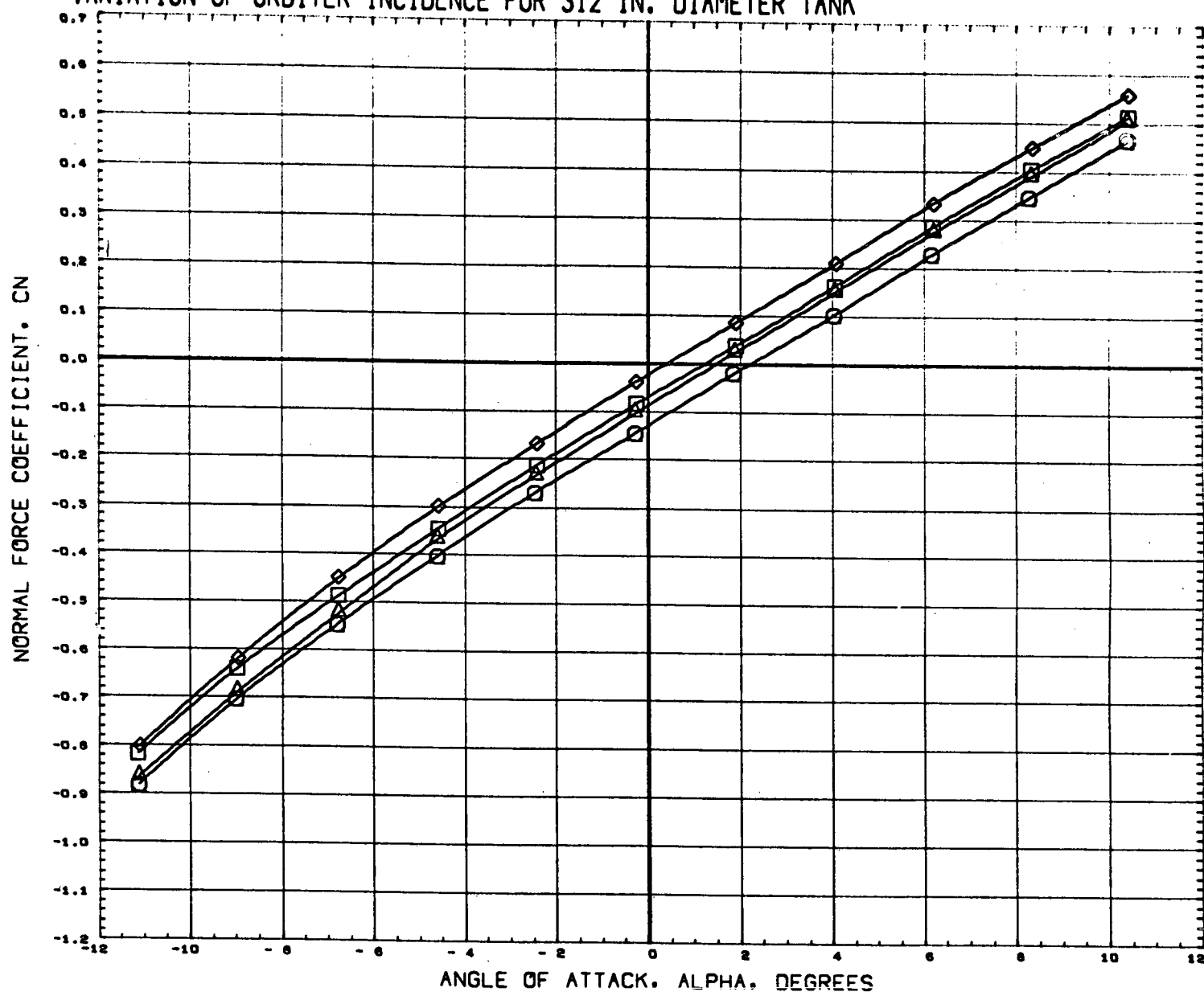


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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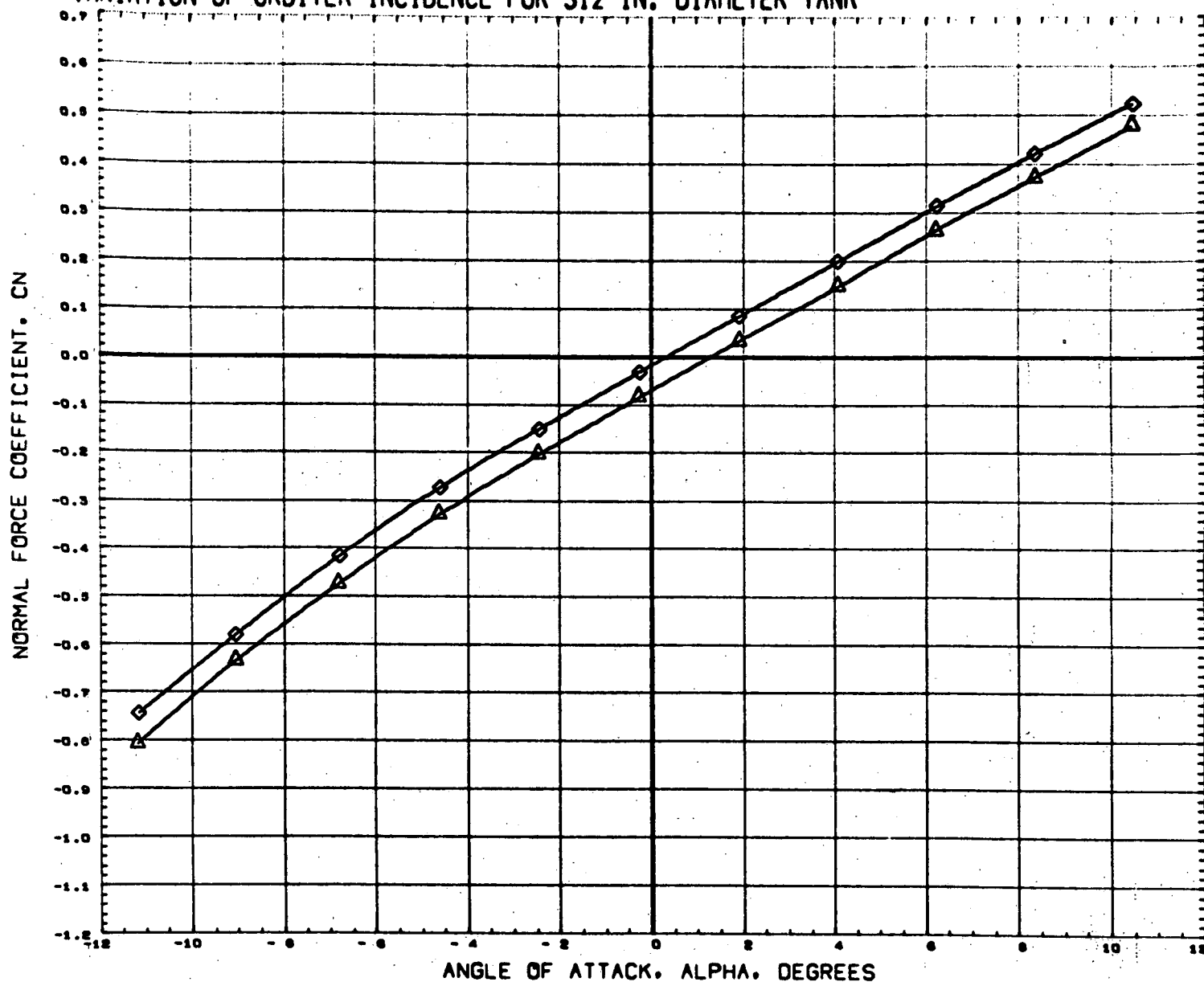
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

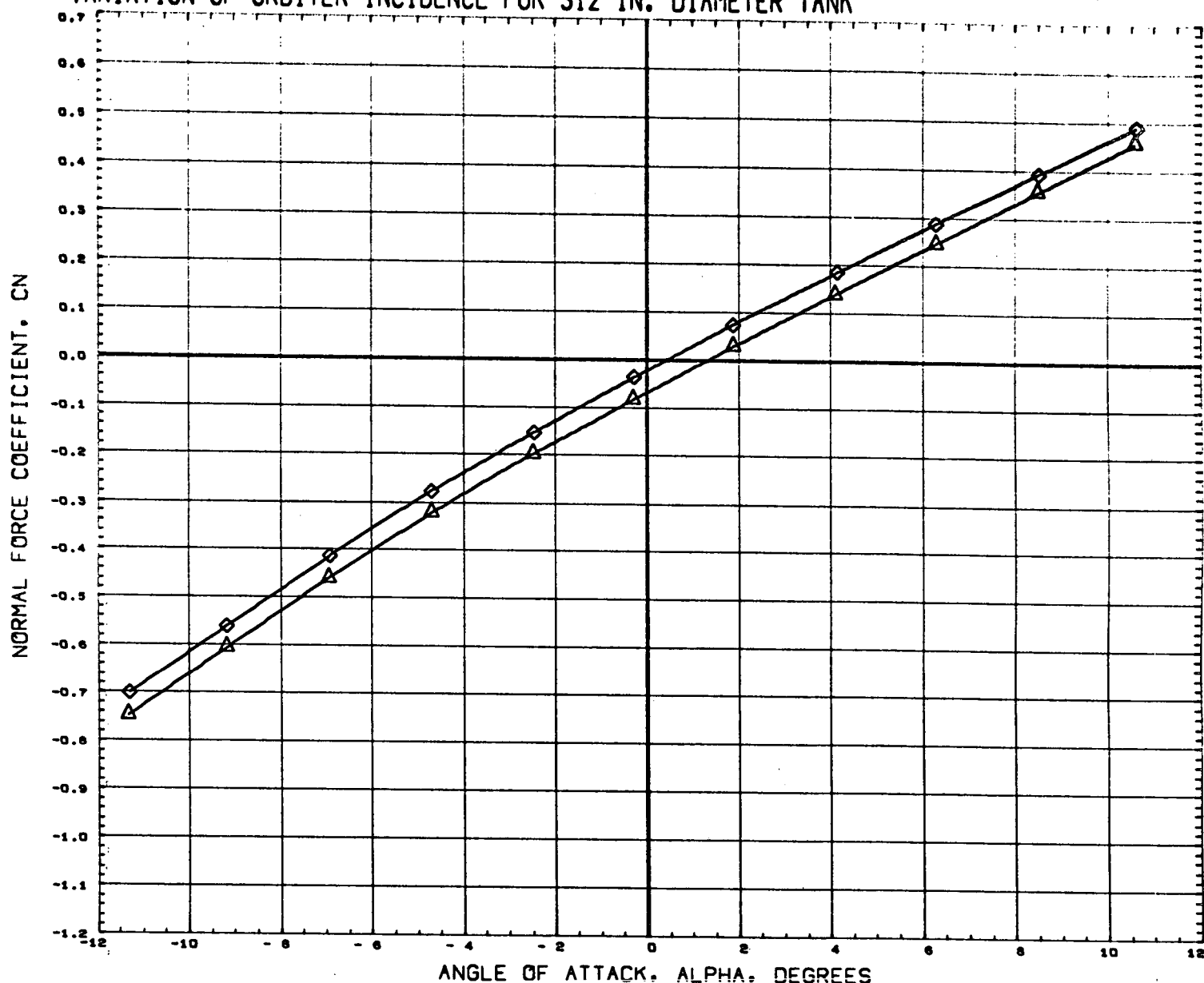
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | VS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---|---------|-------|--------|--------|-----------------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (B71131) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF 2.0260 IN. |
| (B71133) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XNRP 3.3600 IN. |
| | | | | | | YNRP 0.0000 IN. |
| | | | | | | ZNRP 0.2400 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH 1.47

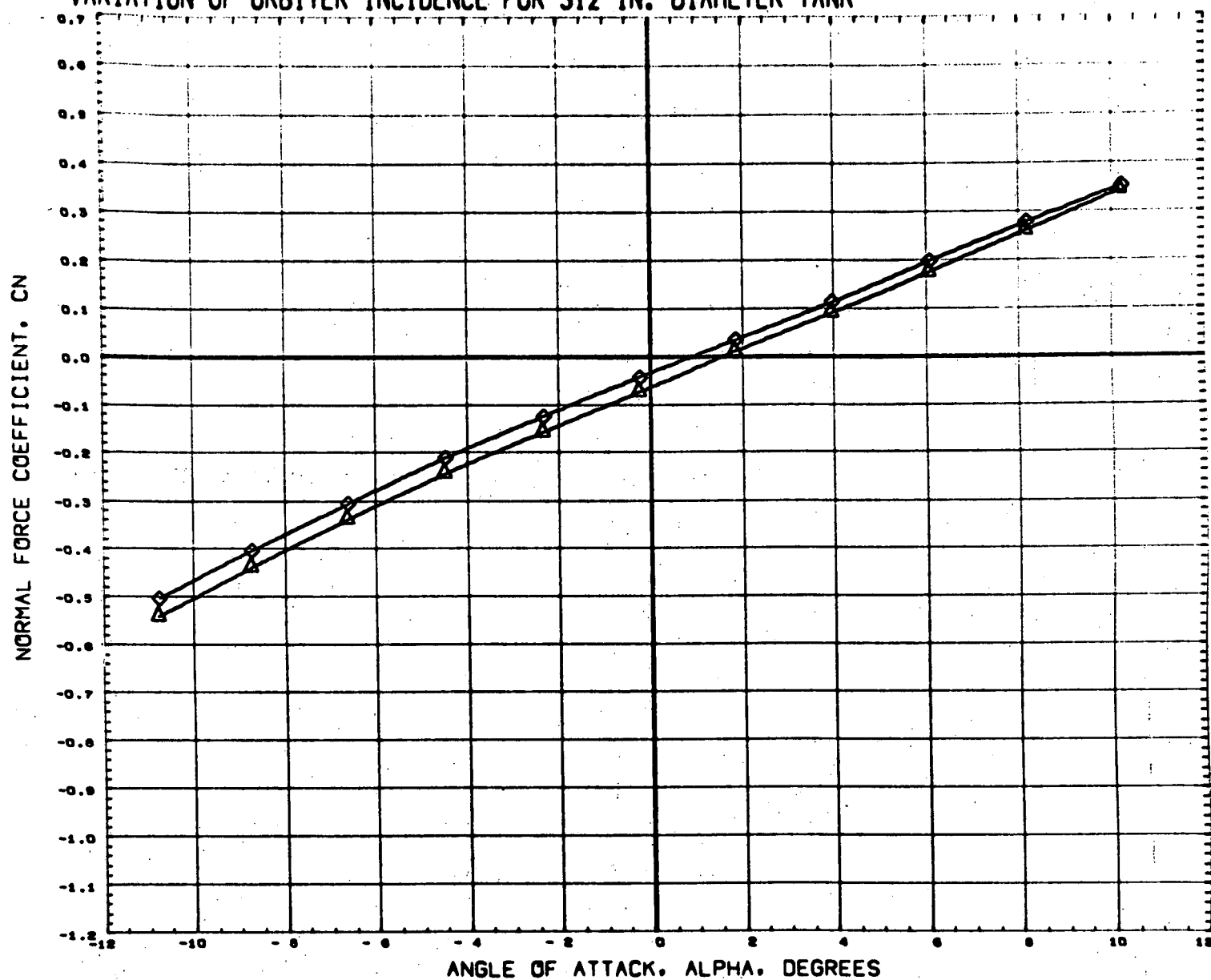
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

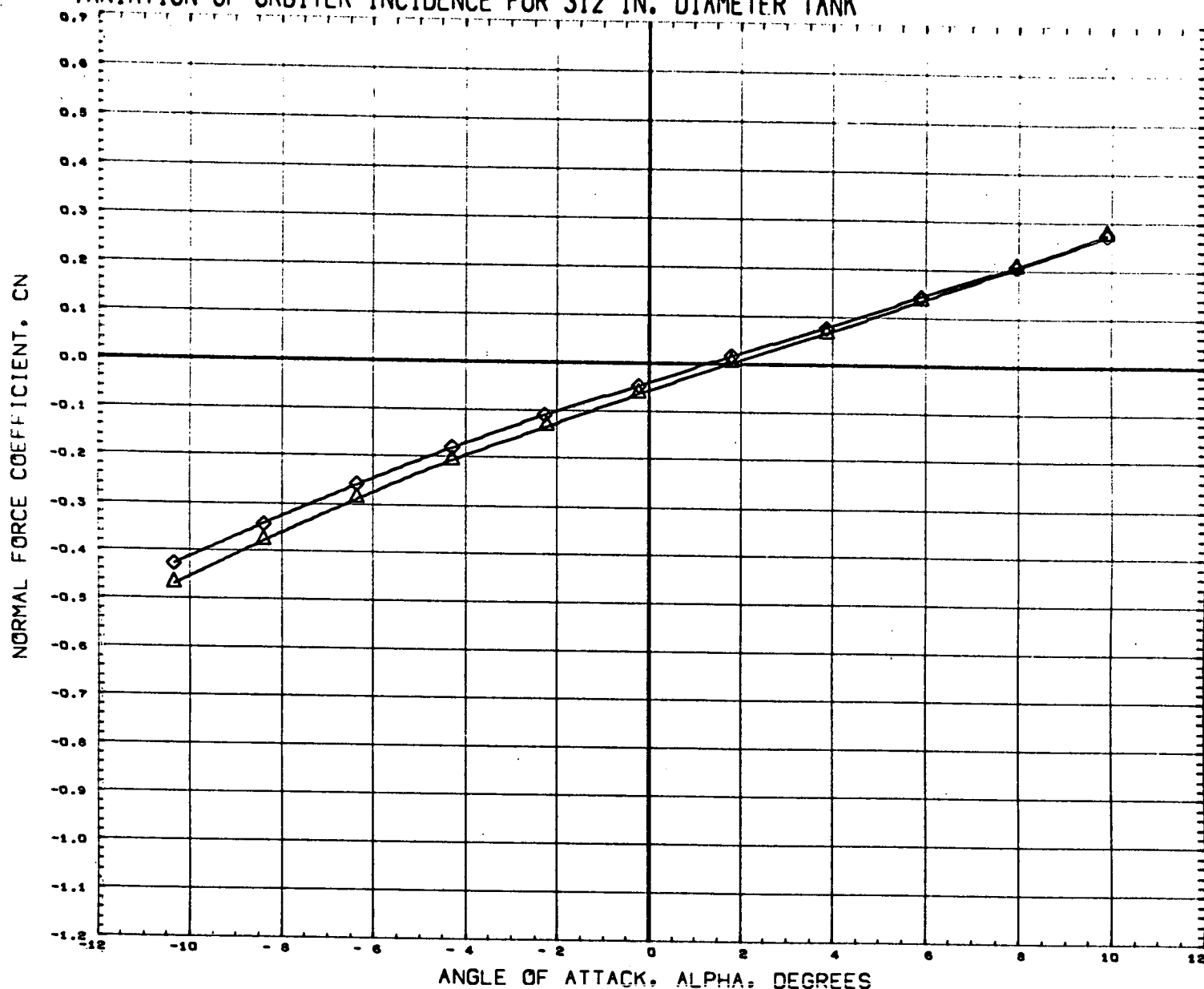


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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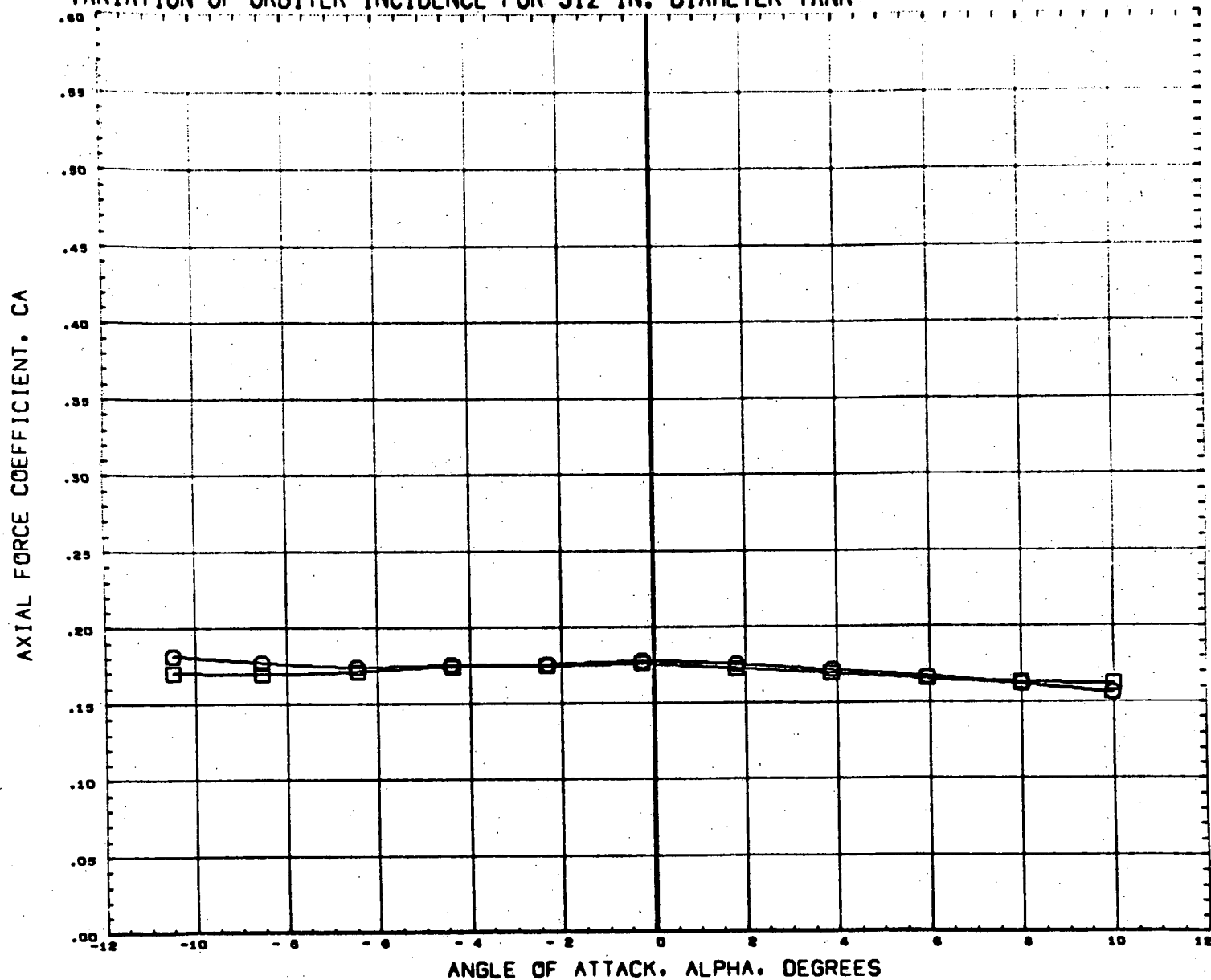
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



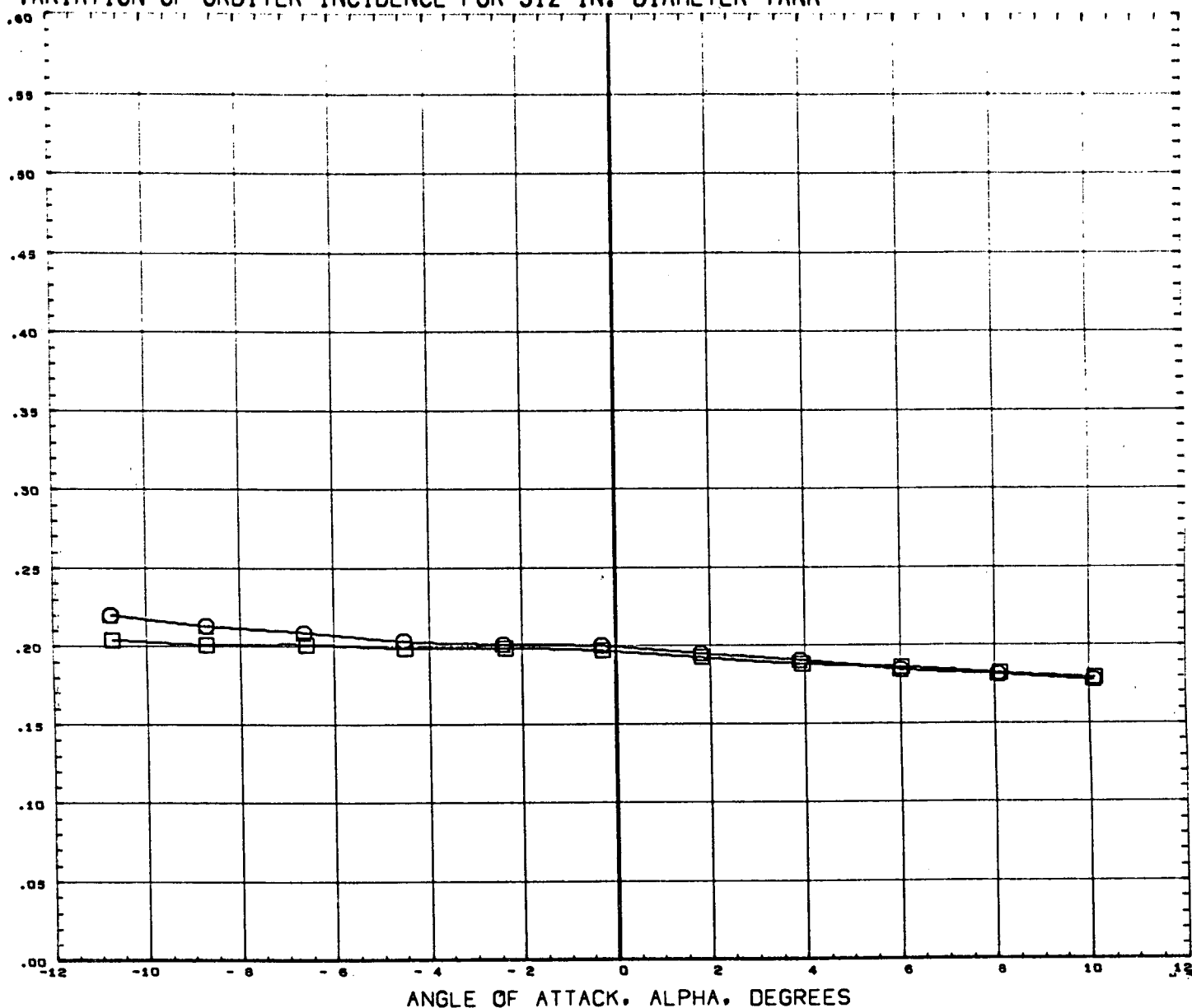
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 205

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

AXIAL FORCE COEFFICIENT, CA



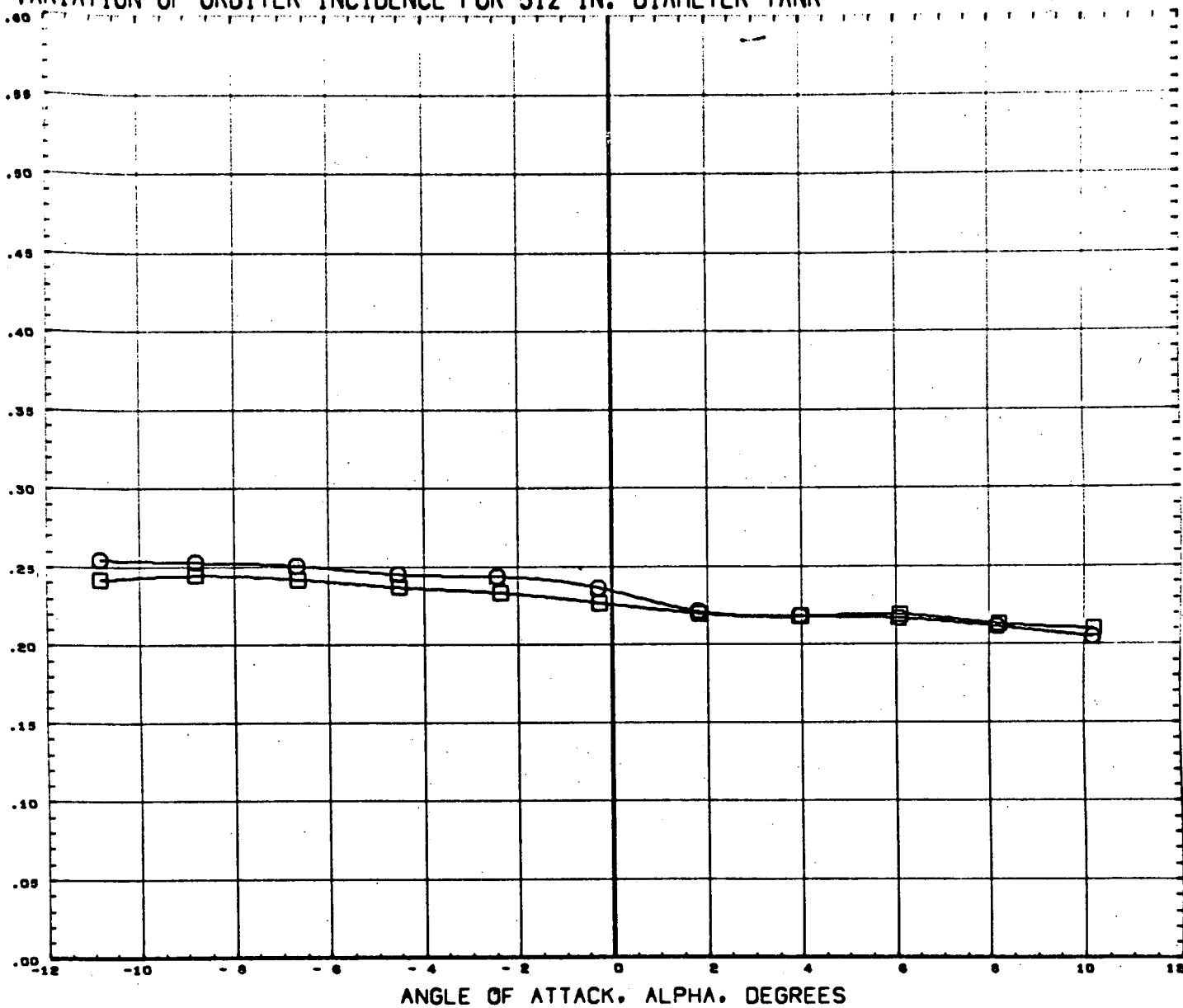
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

PAGE 206

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

AXIAL FORCE COEFFICIENT, CA

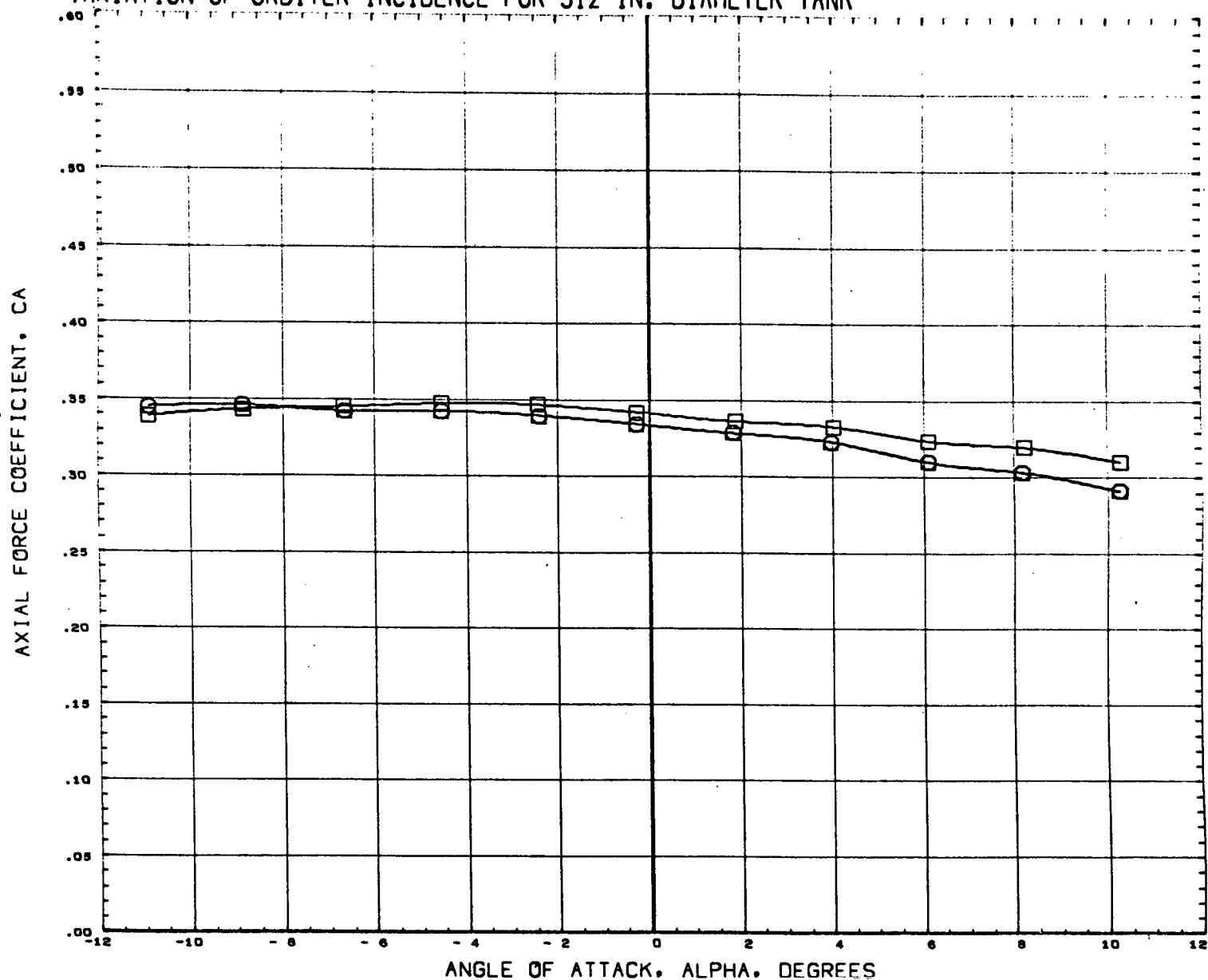


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .91

PAGE 207

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



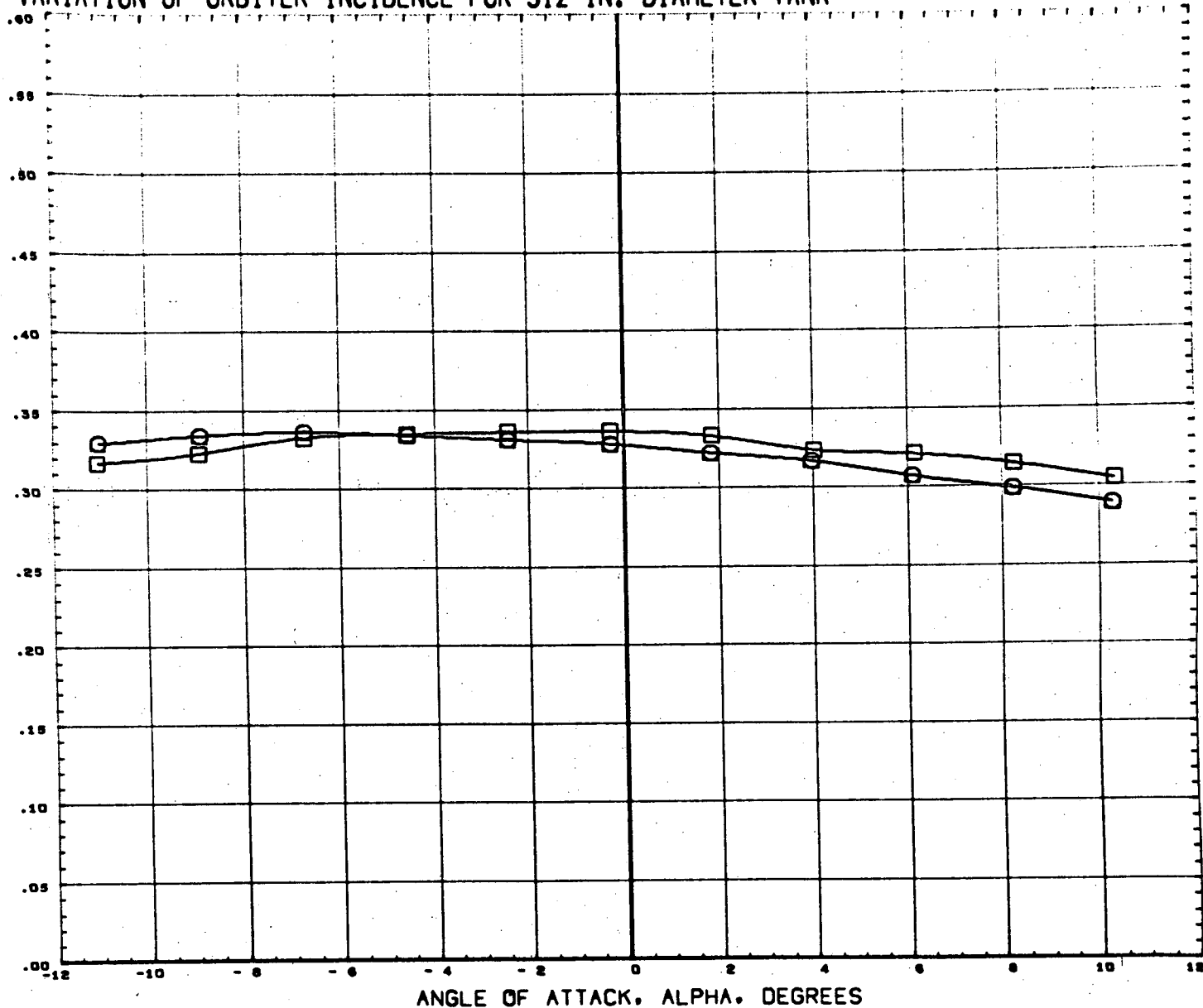
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

PAGE 208

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

AXIAL FORCE COEFFICIENT, CA

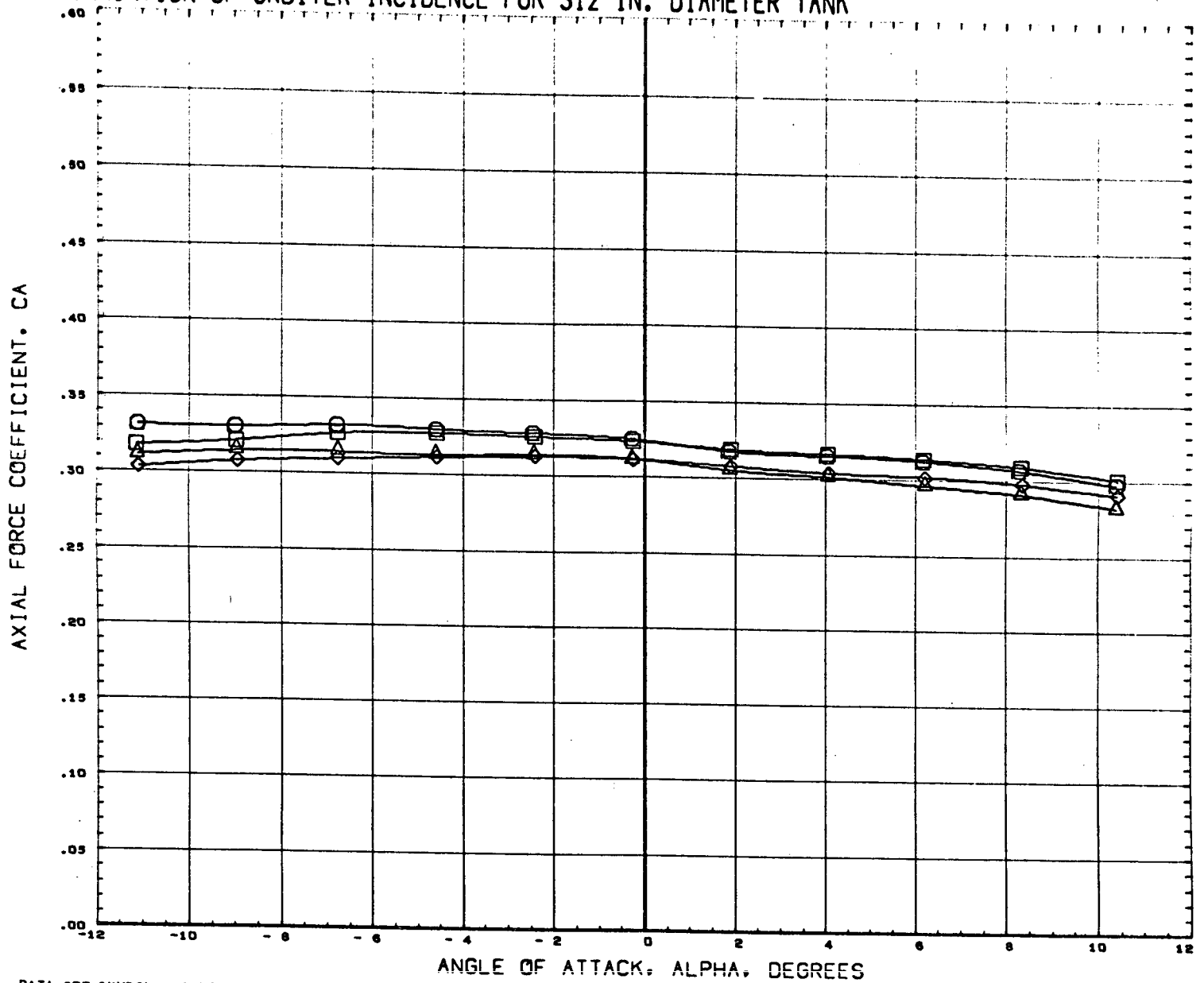


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

PAGE 209

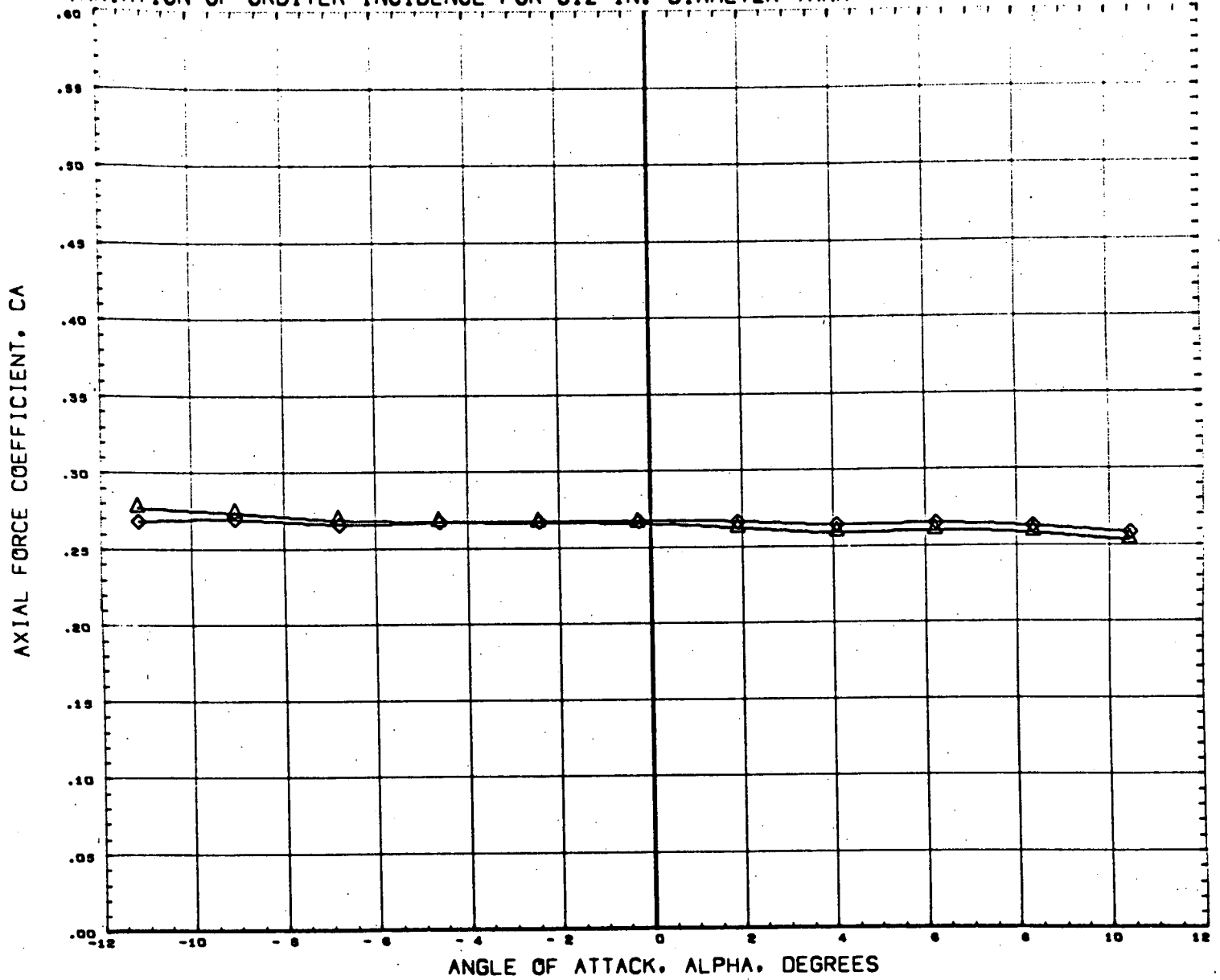
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

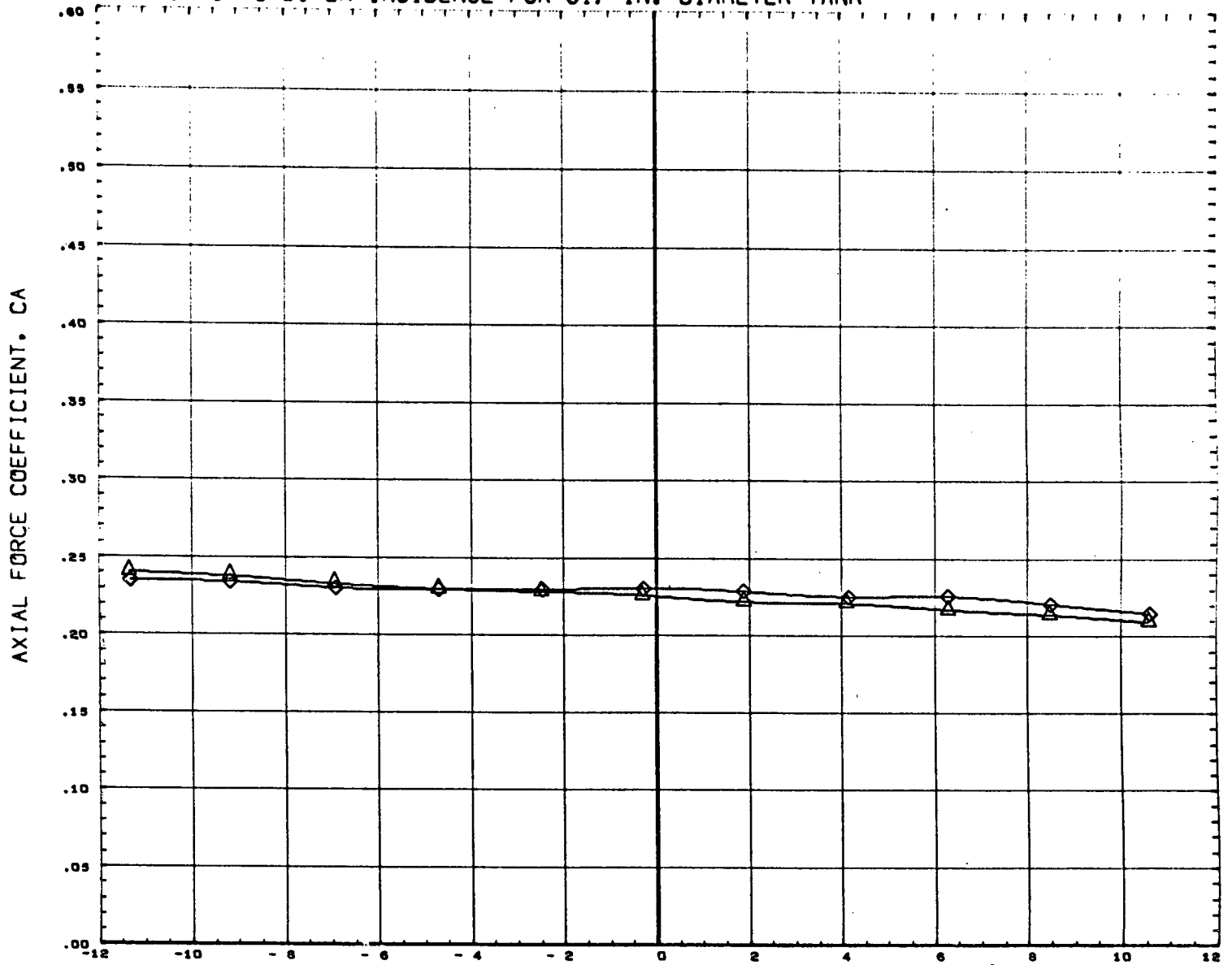


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| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.47

PAGE 211

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

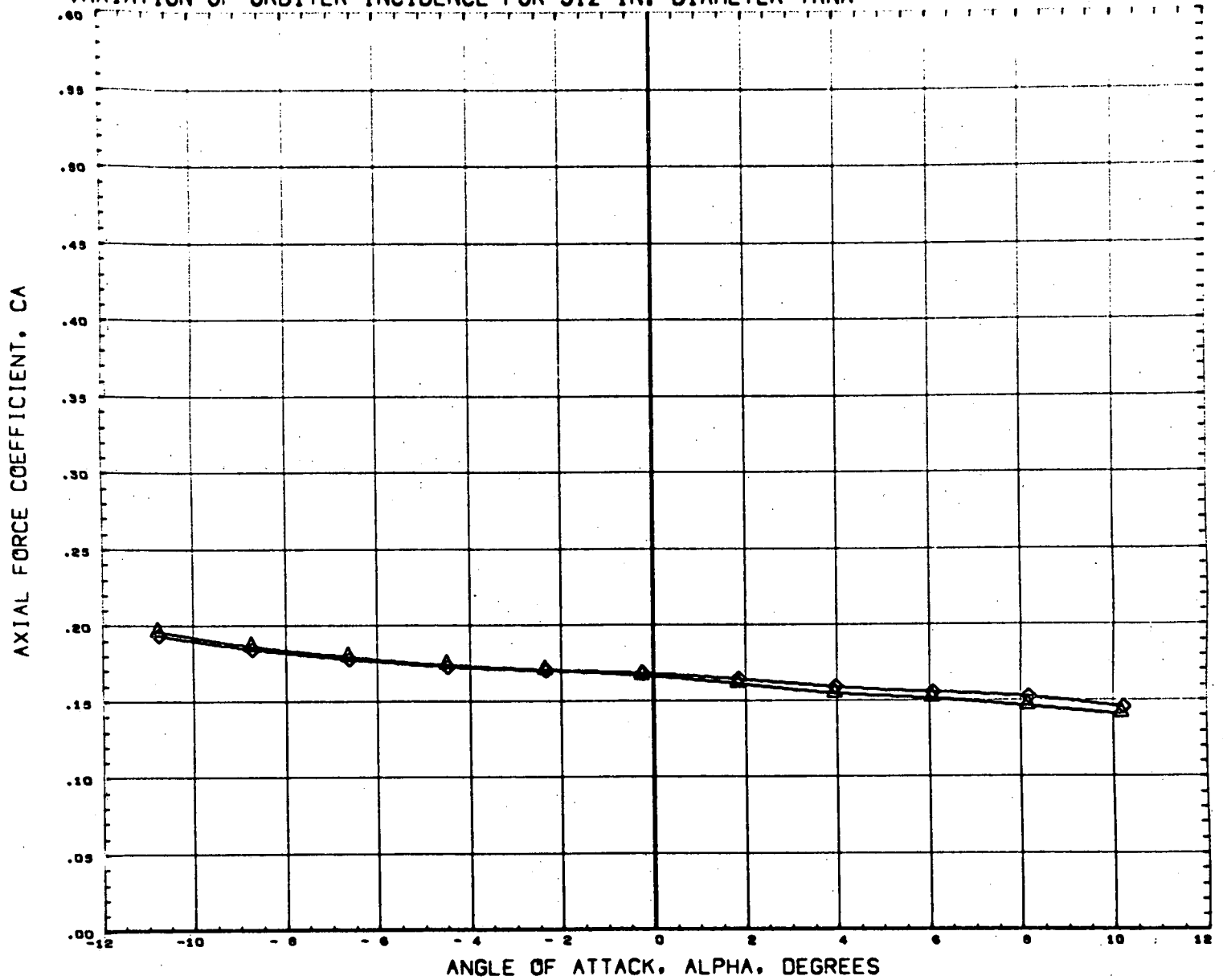


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| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

PAGE 212

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

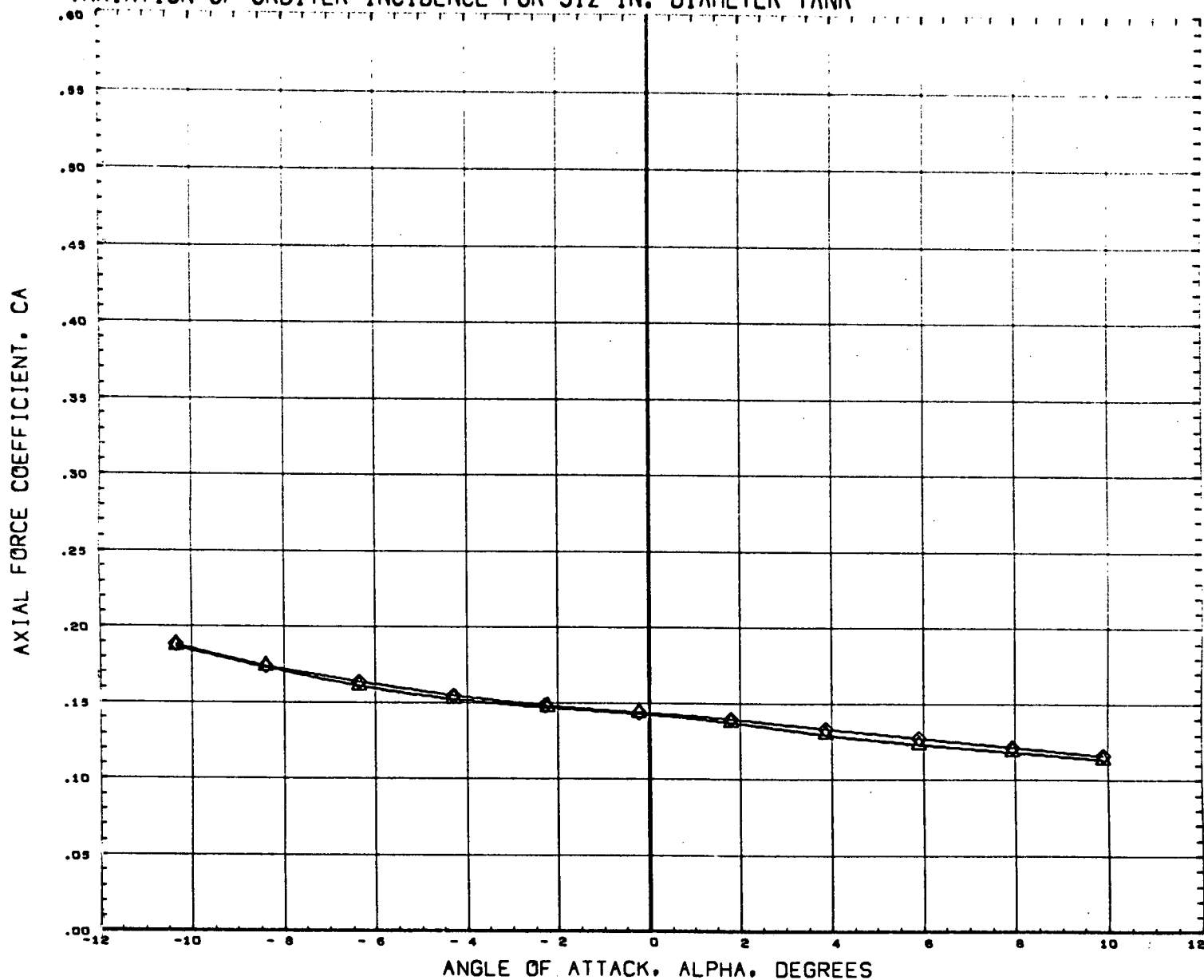


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| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

PAGE 213

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



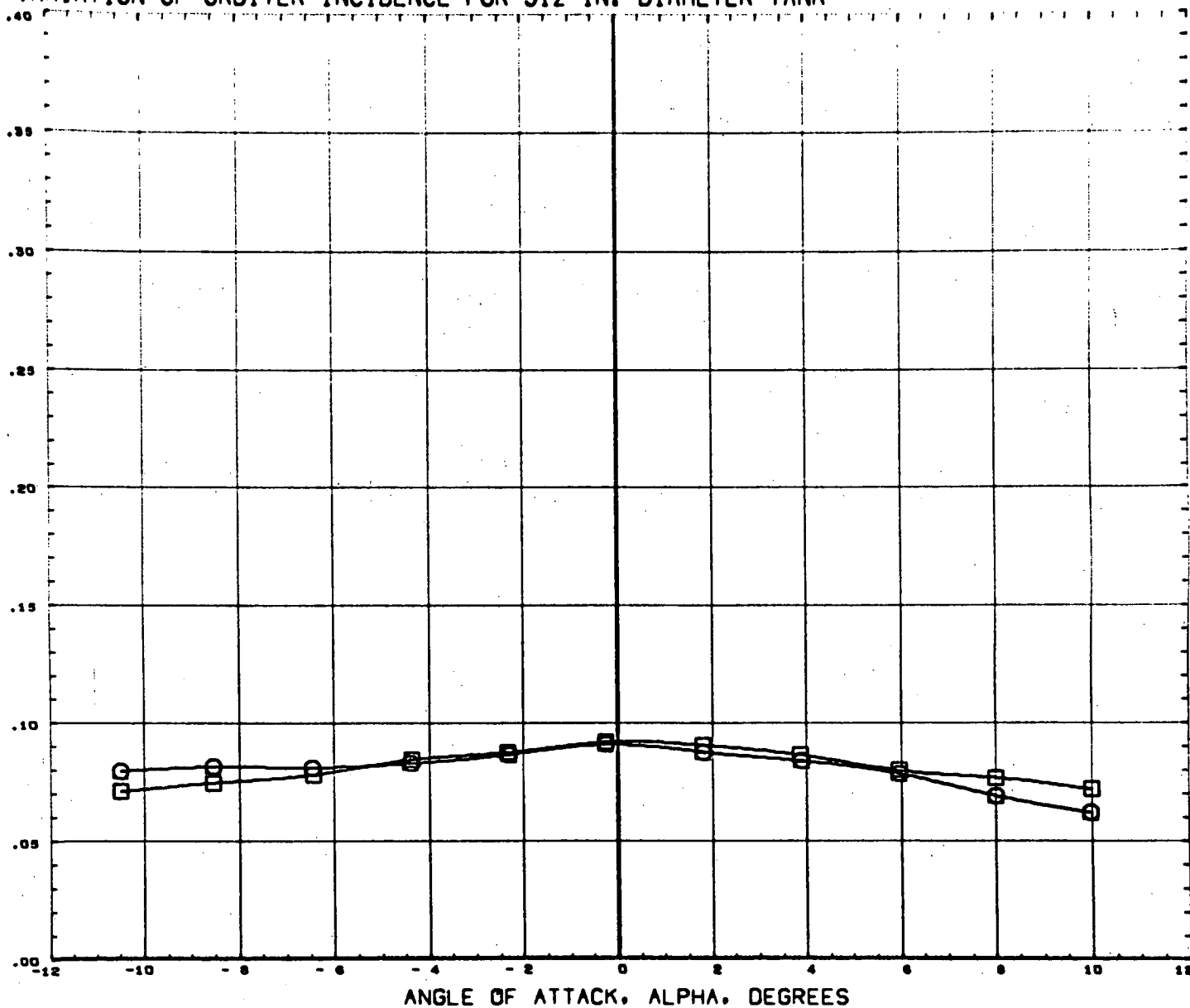
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

PAGE 214

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

FOREBODY AXIAL FORCE COEFFICIENT, CAF



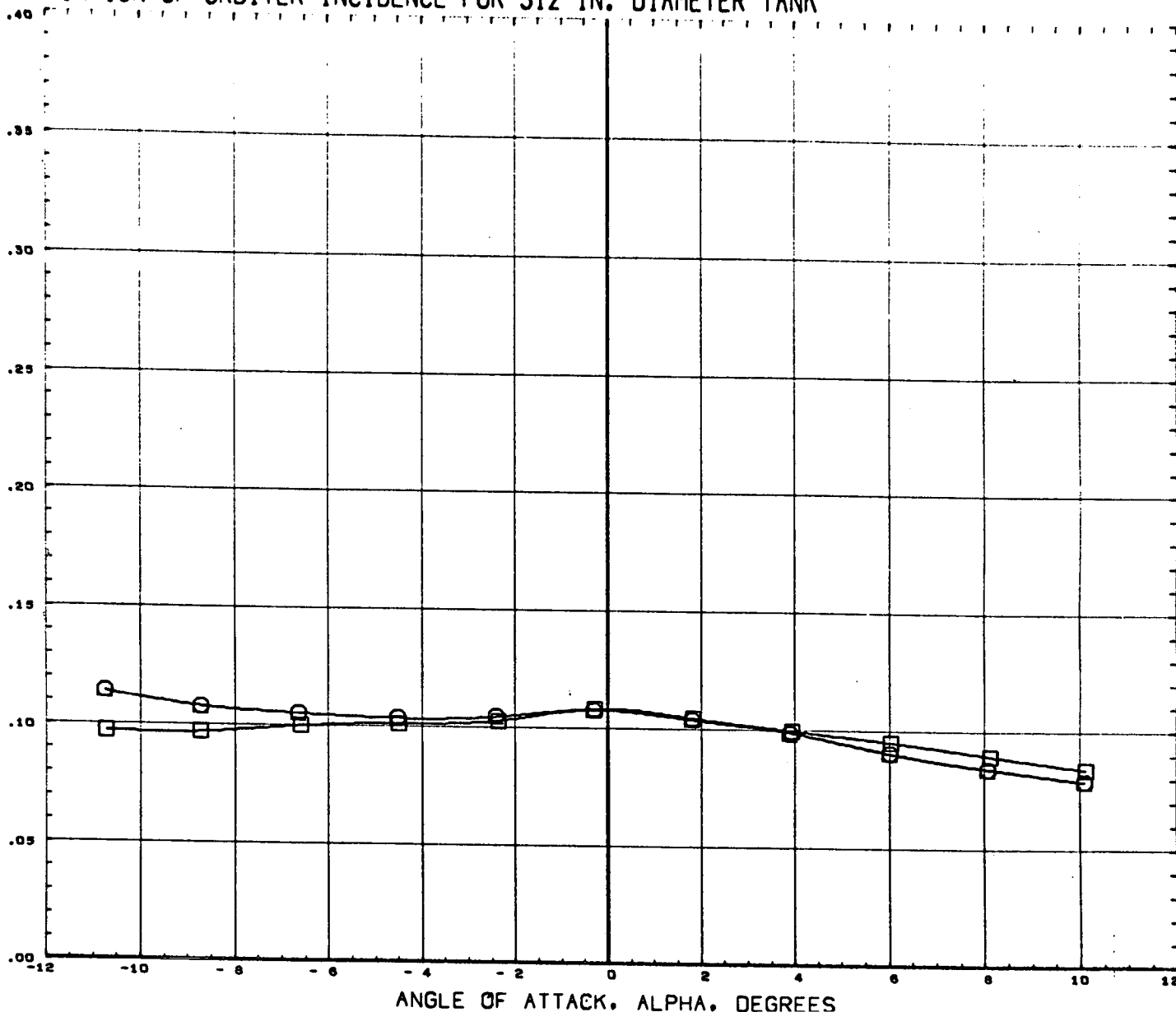
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 215

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

FOREBODY AXIAL FORCE COEFFICIENT, CAF

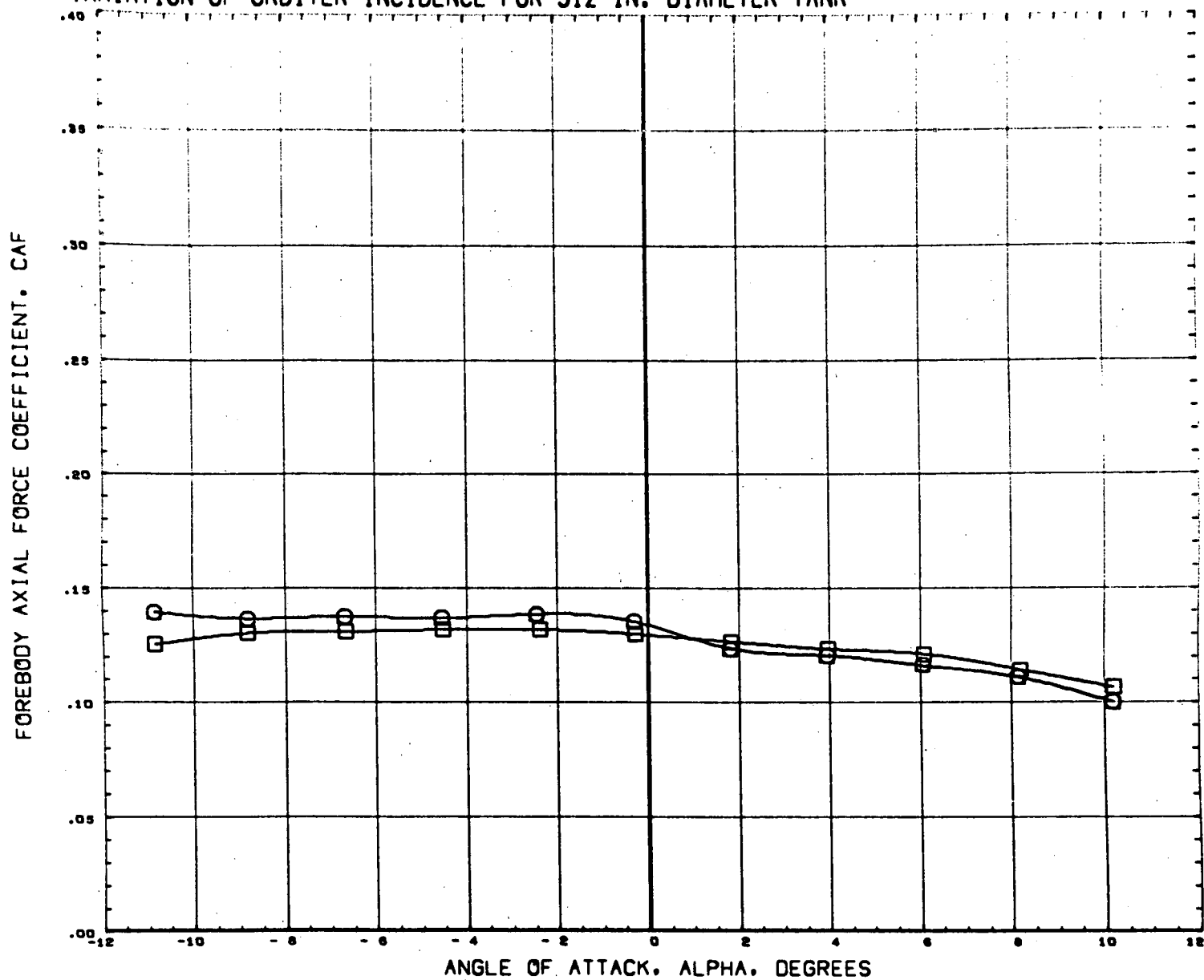


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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.80

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

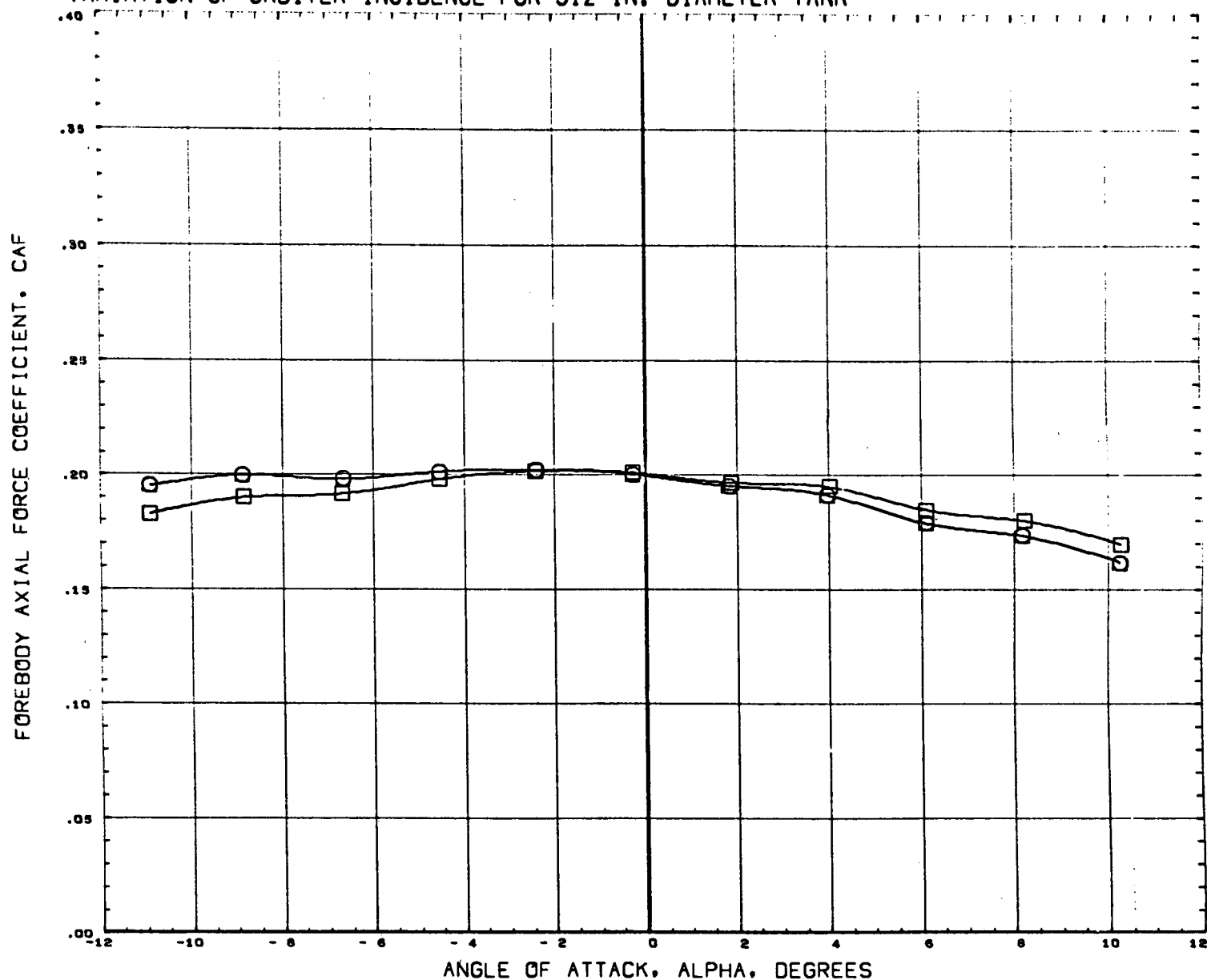


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| (871129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 30. IN. |
| (871131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 1N. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 1N. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 1N. |
| | | | | | | YMRP | 0.0000 1N. |
| | | | | | | ZMRP | 0.2460 1N. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .91

PAGE 217

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



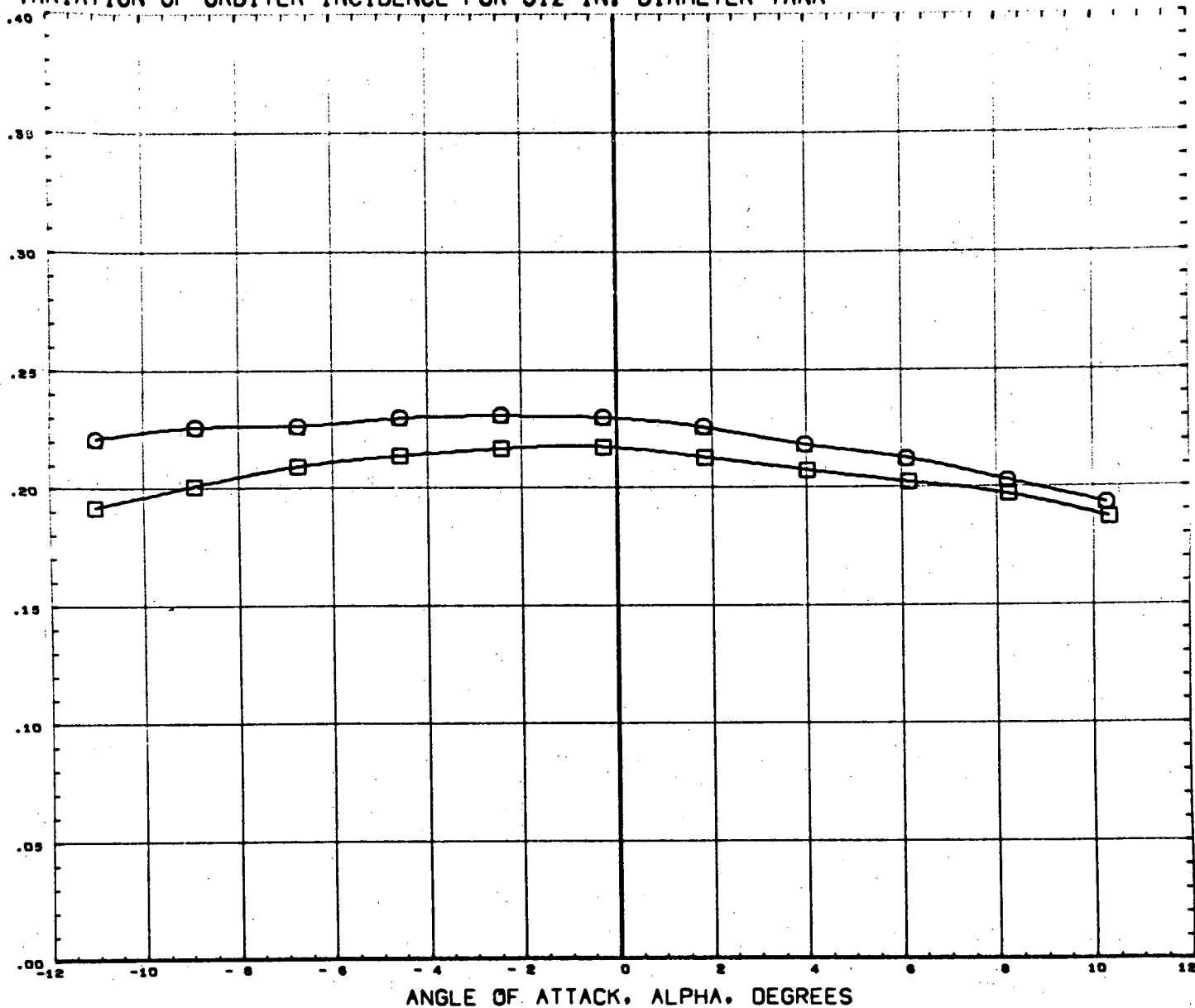
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

PAGE 218

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

FOREBODY AXIAL FORCE COEFFICIENT, CAF



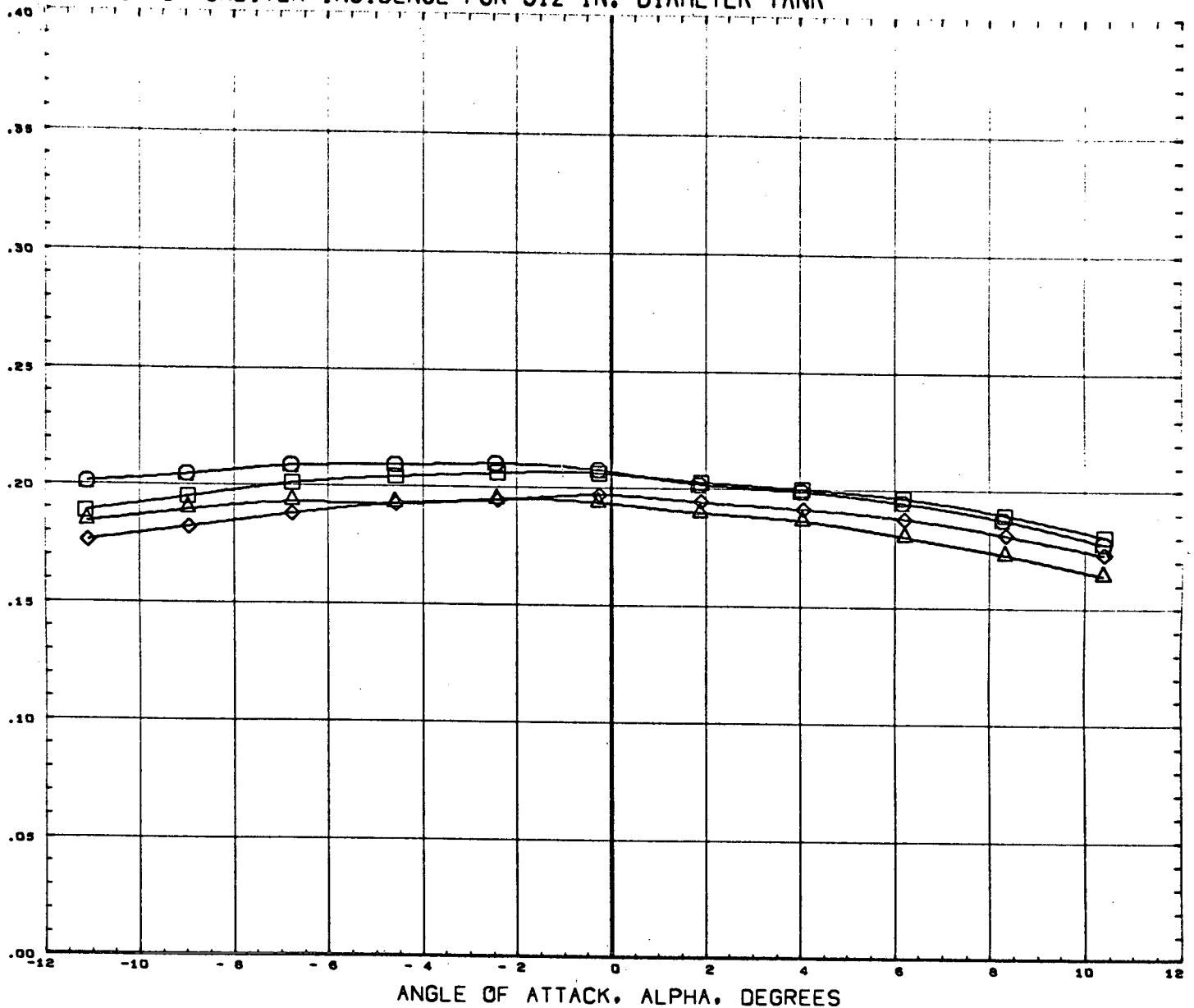
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| (871129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (871131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

PAGE 219

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

FOREBODY AXIAL FORCE COEFFICIENT, CAF



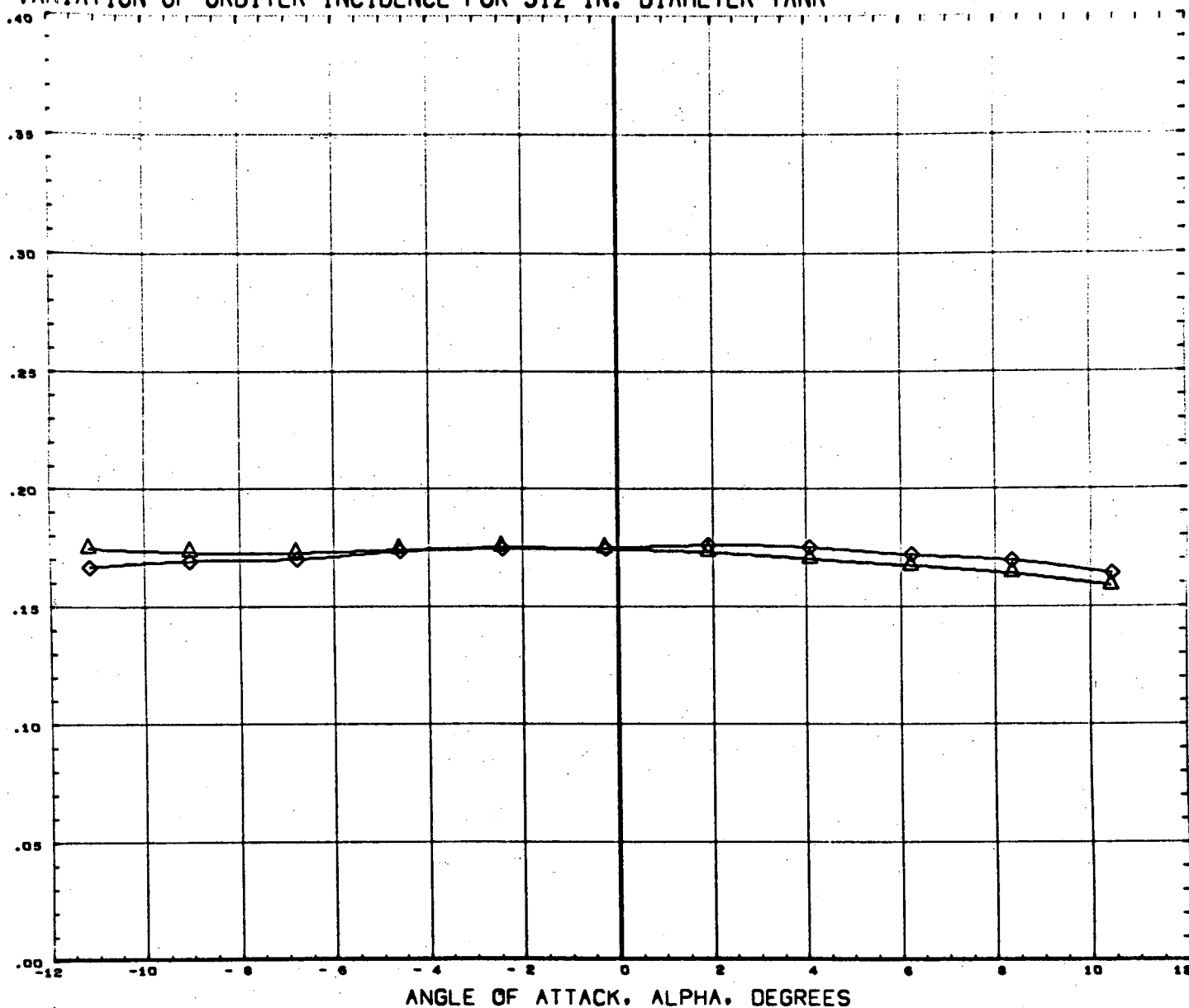
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| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

PAGE 220

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

FOREBODY AXIAL FORCE COEFFICIENT, CAF



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

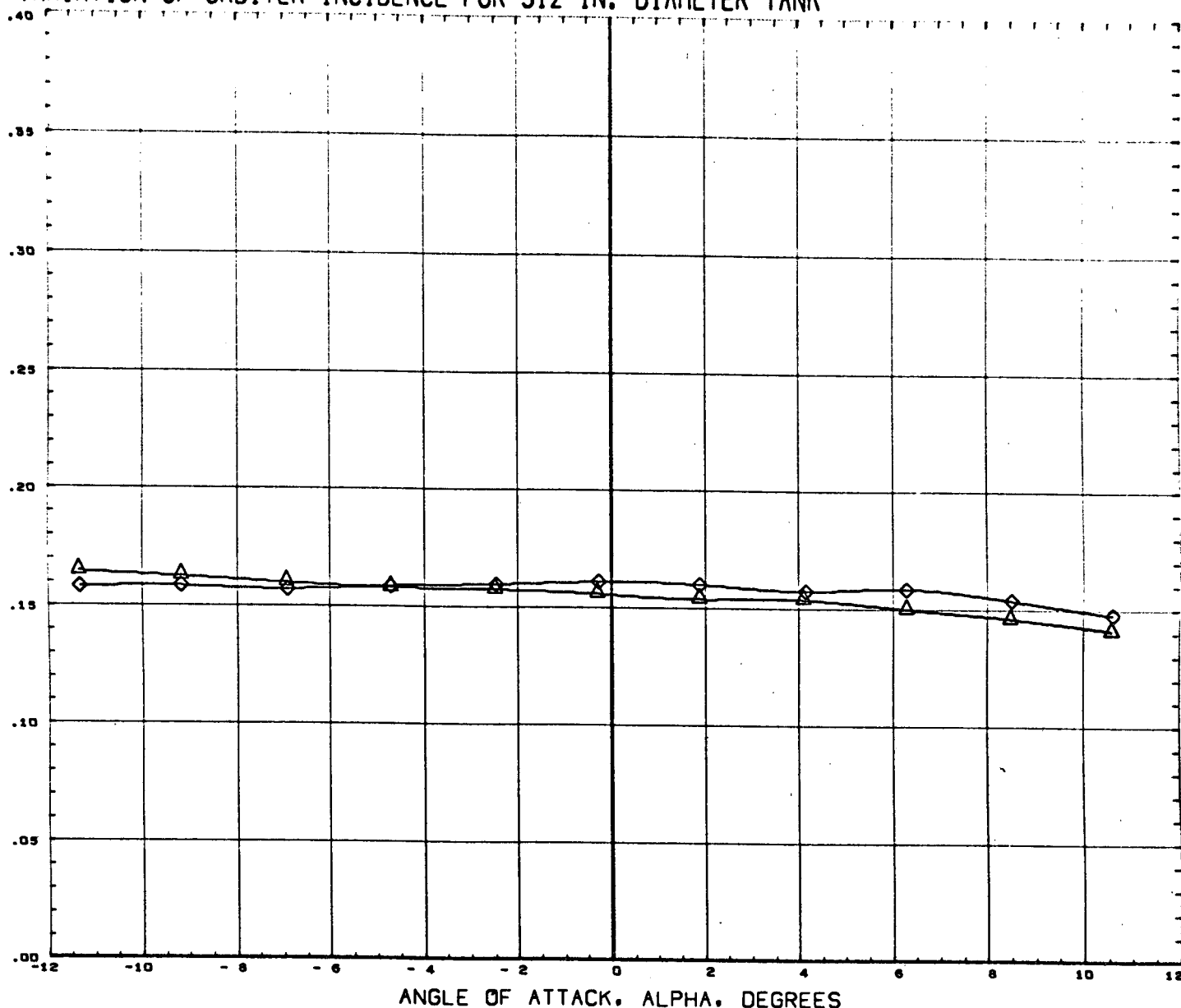
MACH

1.47

PAGE 221

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

FOREBODY AXIAL FORCE COEFFICIENT, CAF



ANGLE OF ATTACK, ALPHA, DEGREES

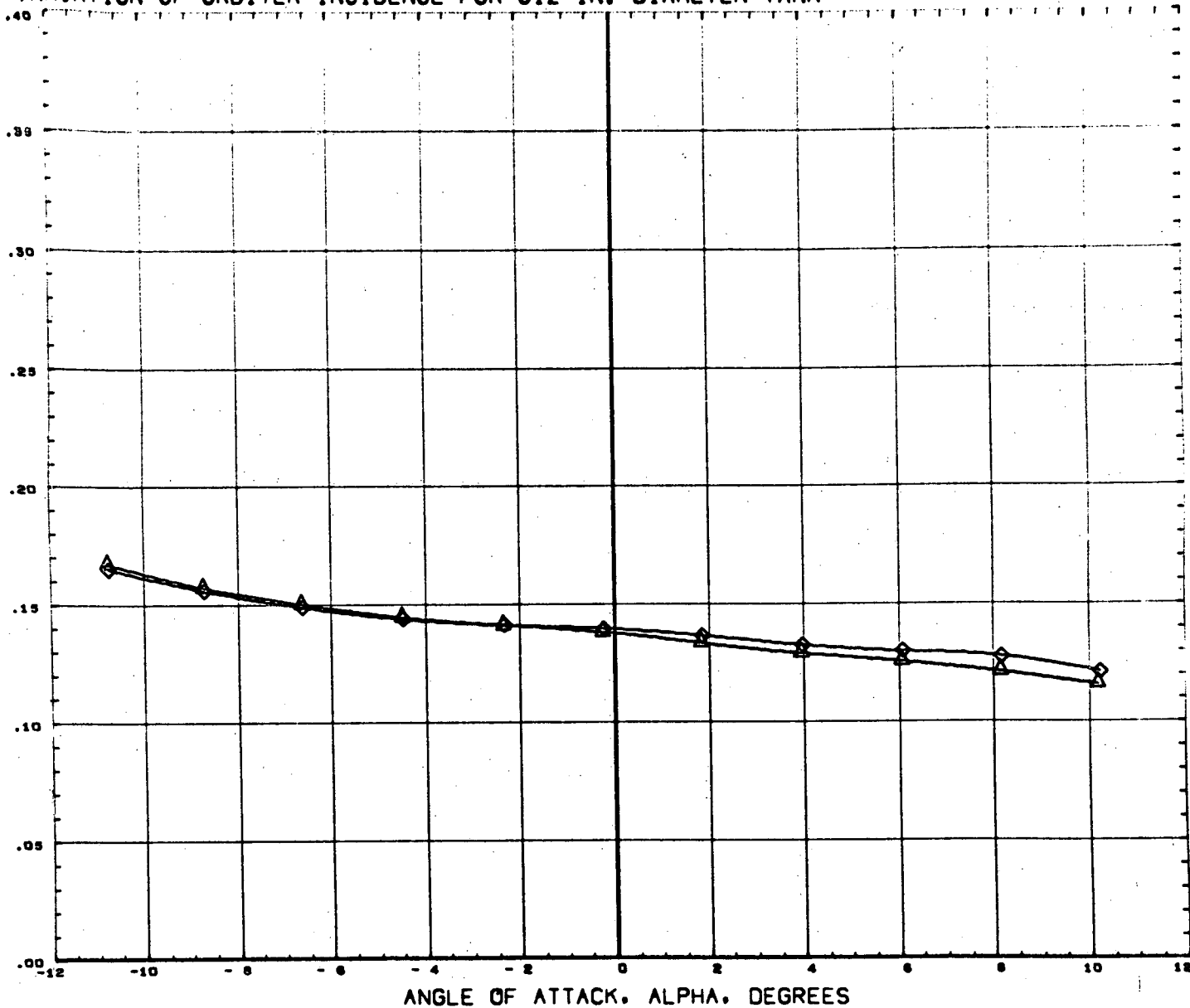
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| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
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| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T9C2S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
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| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

PAGE 222

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

FOREBODY AXIAL FORCE COEFFICIENT, CAF



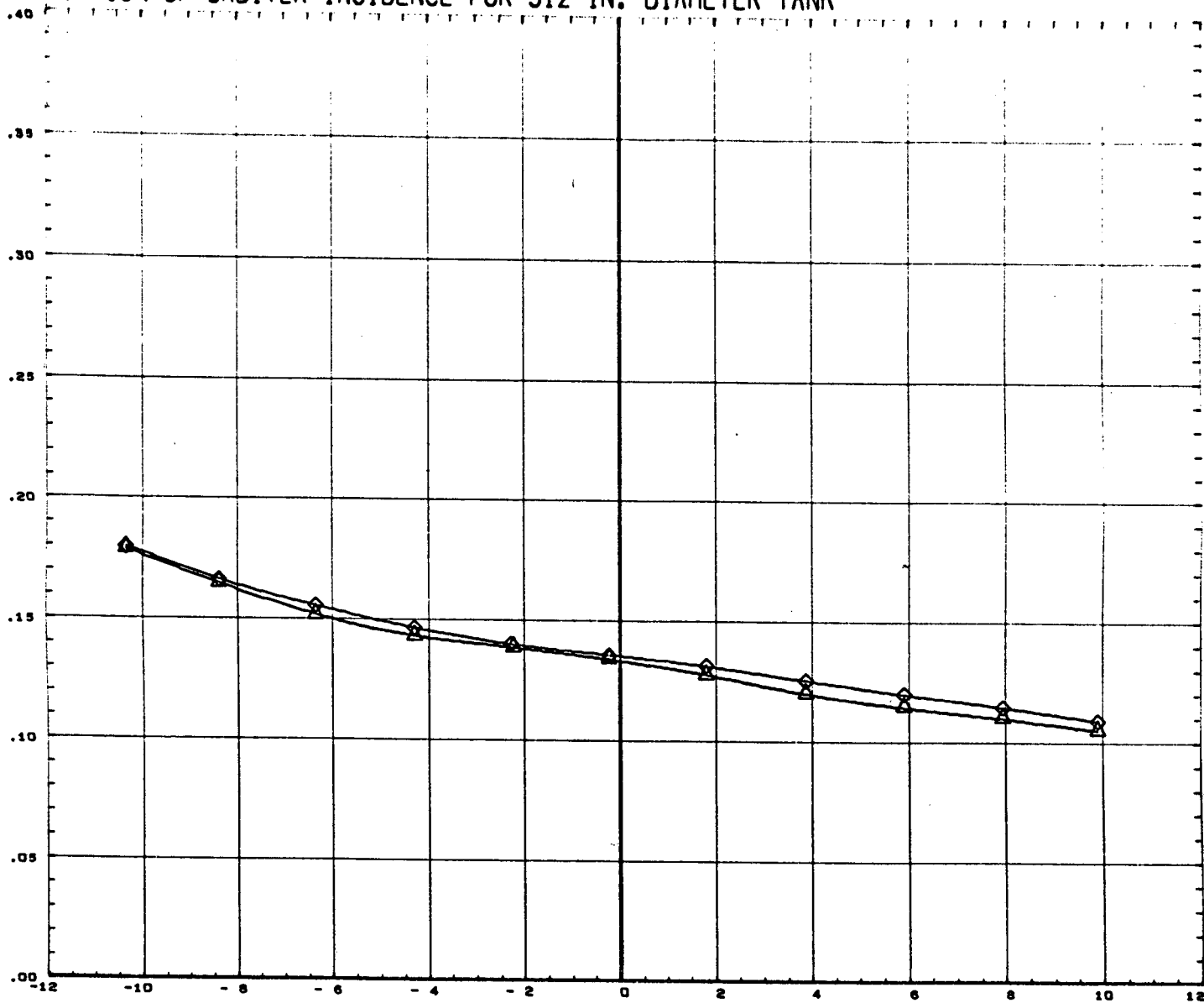
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

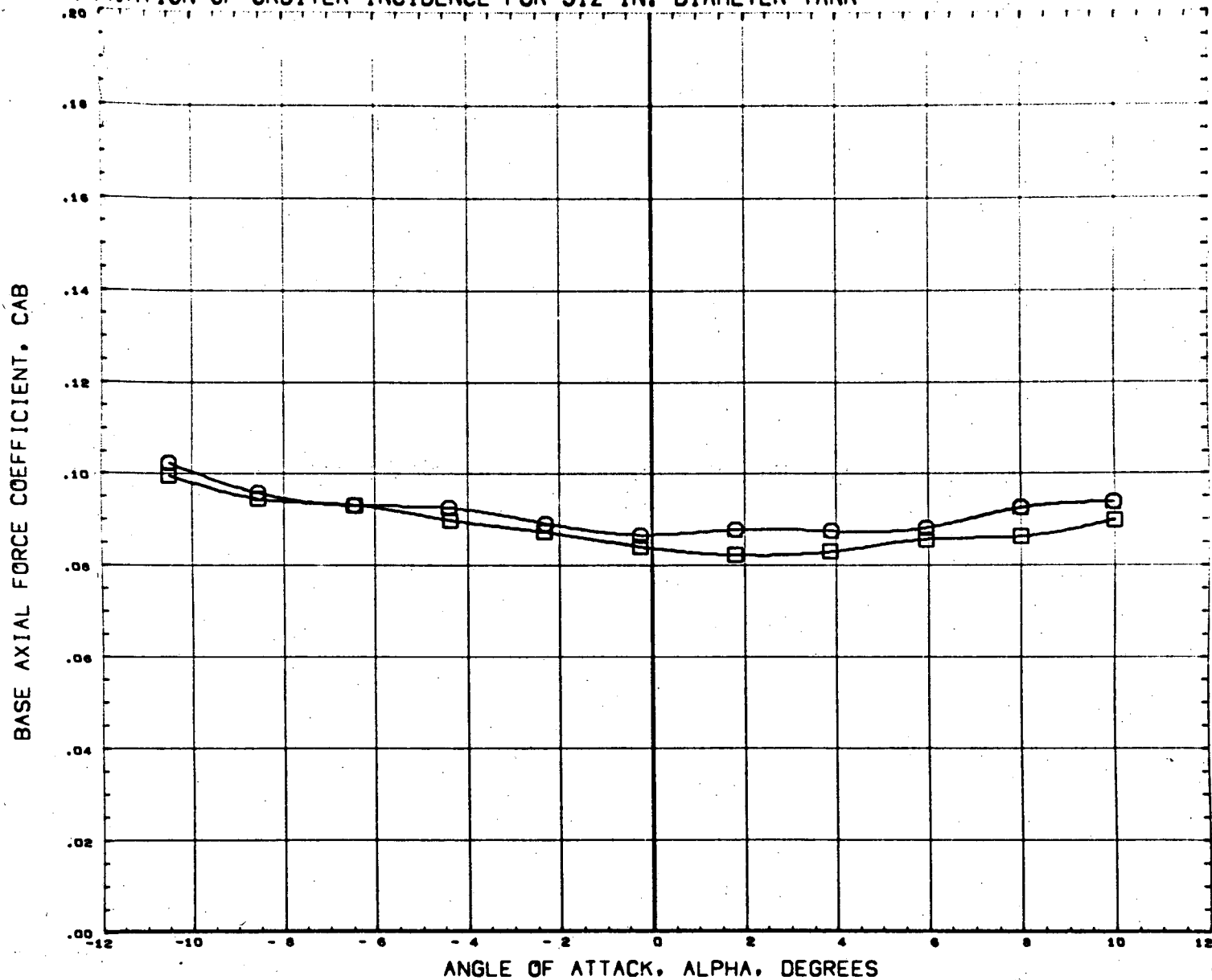
FOREBODY AXIAL FORCE COEFFICIENT, CAF



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



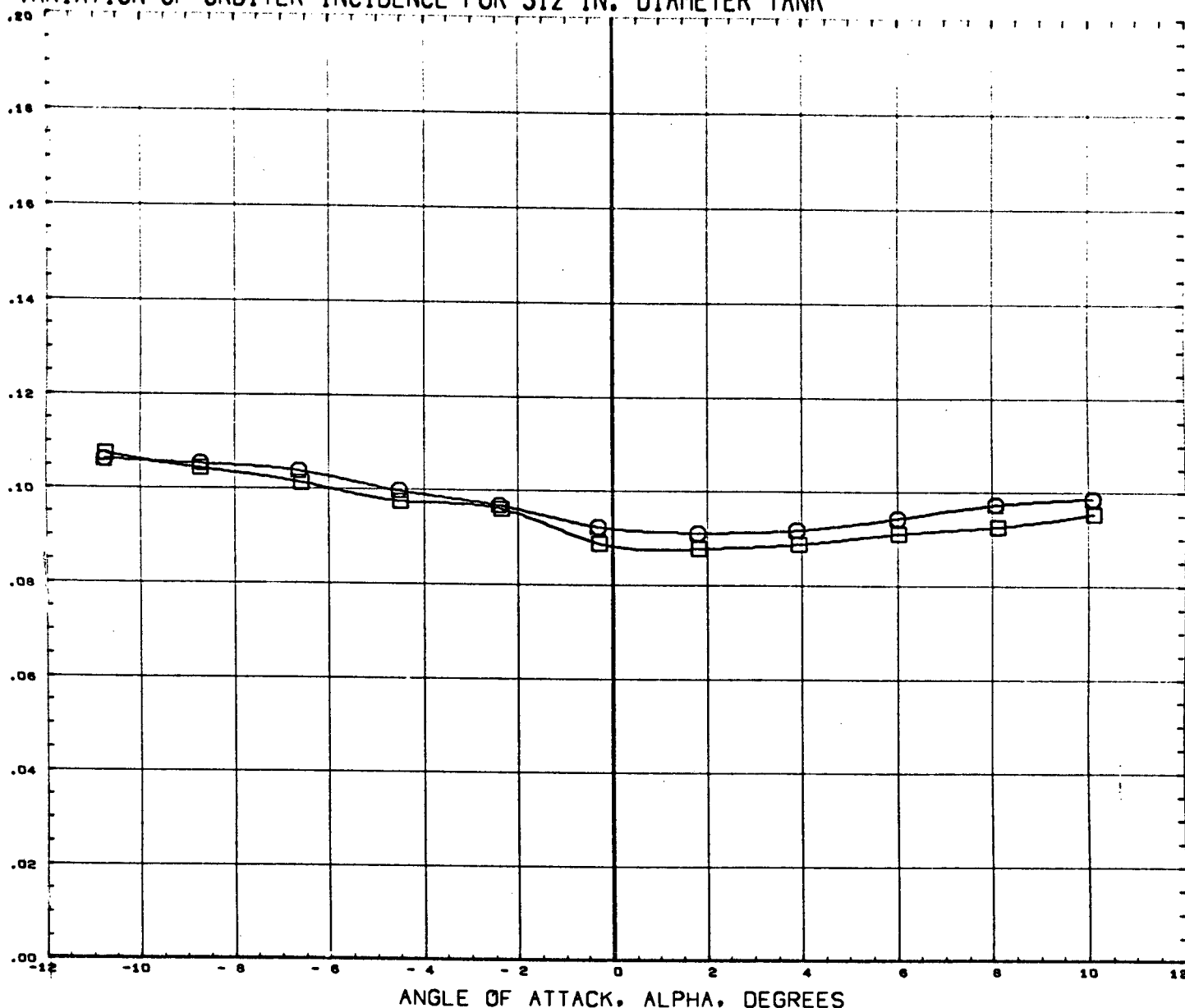
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 225

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

BASE AXIAL FORCE COEFFICIENT, CAB



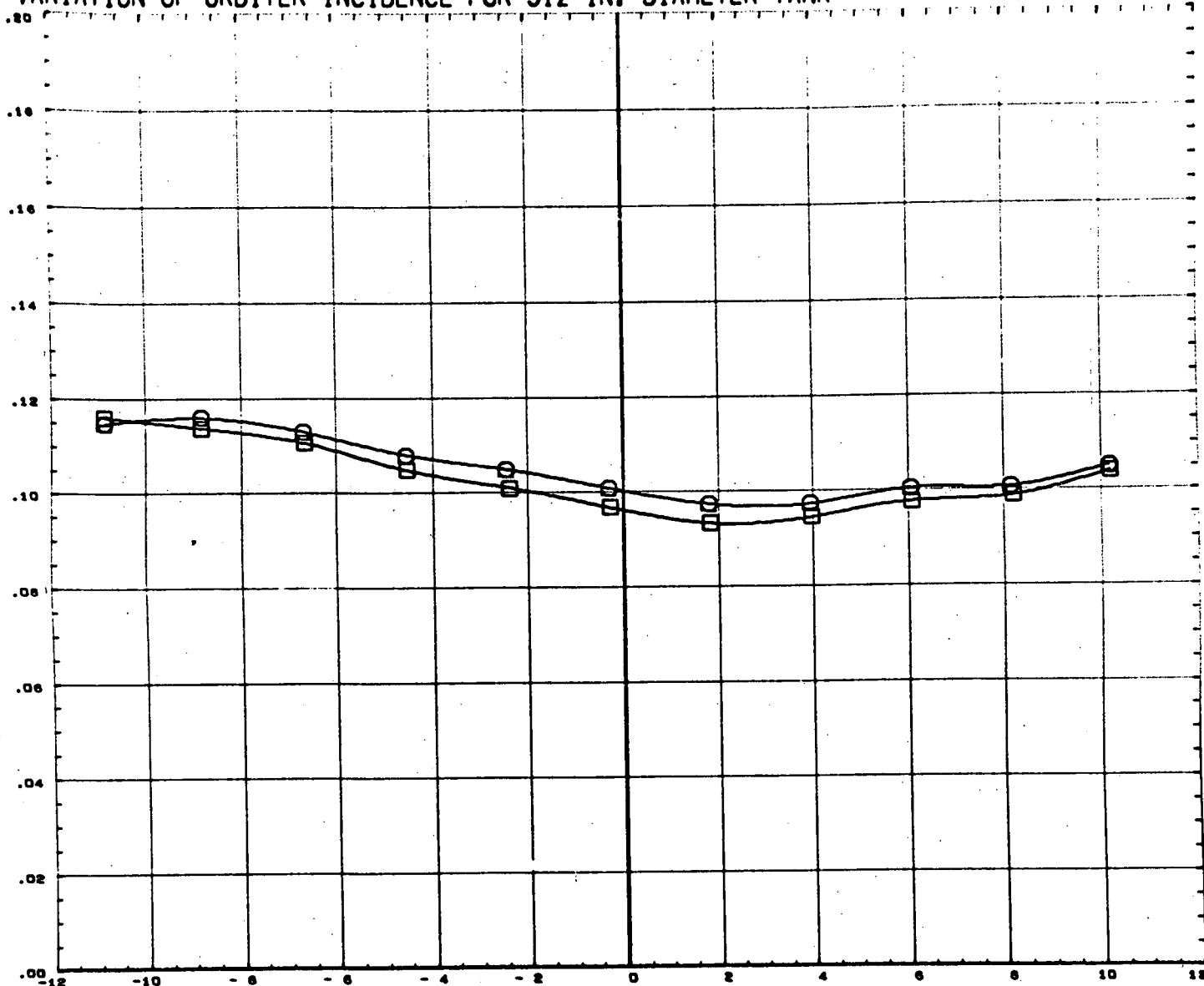
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

PAGE 226

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

BASE AXIAL FORCE COEFFICIENT, CAB



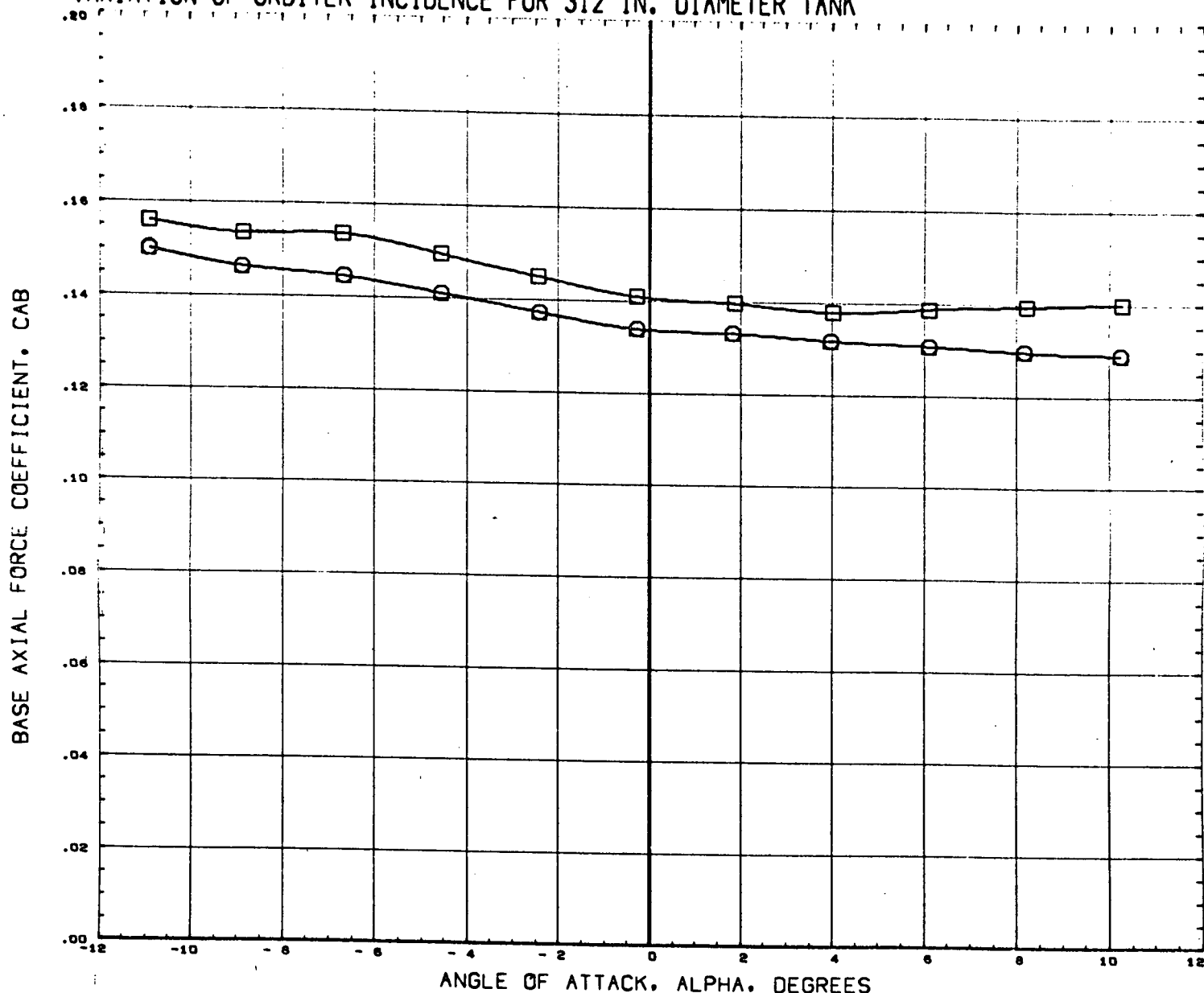
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|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.91

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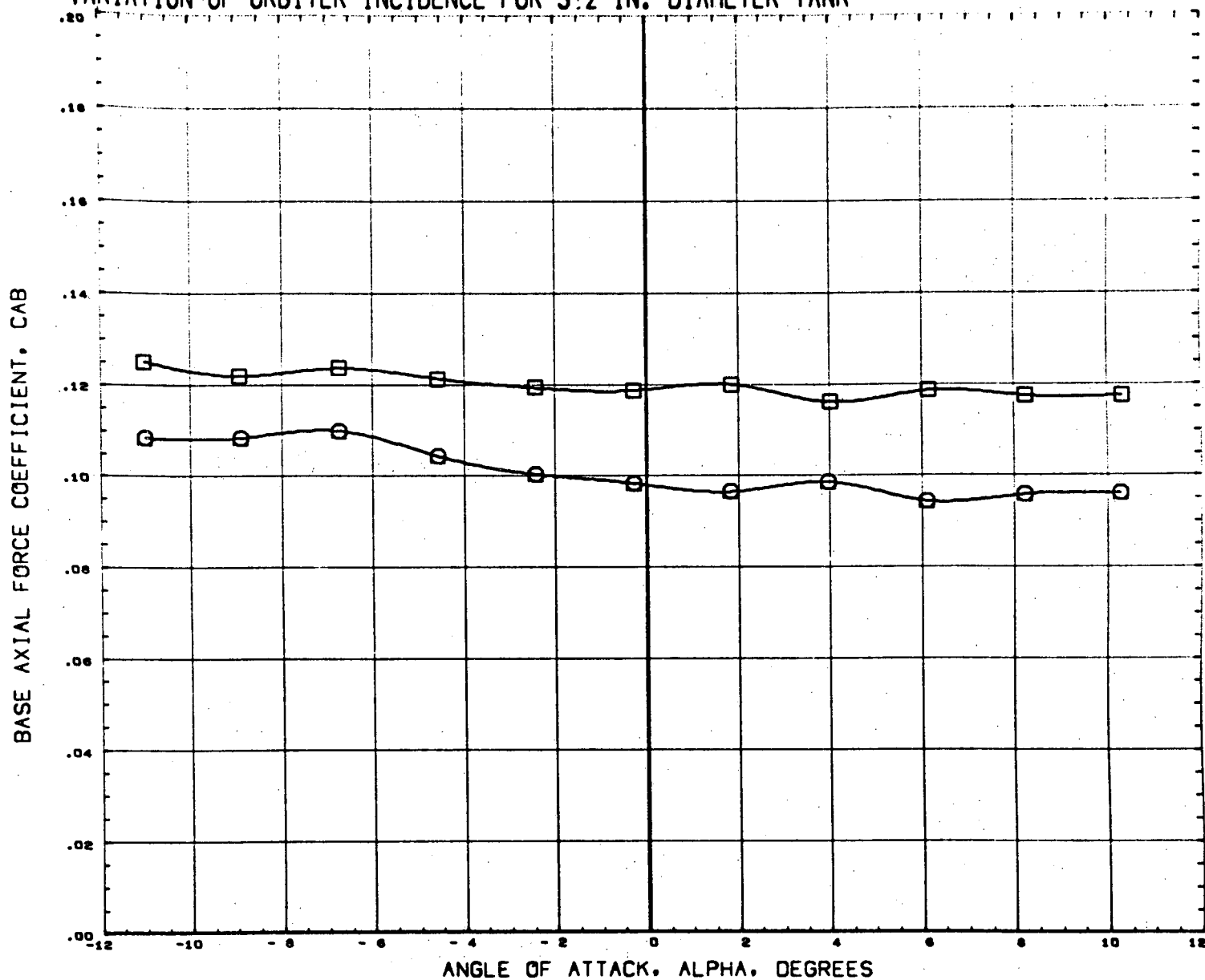
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

VARIATION OF ORBITER INCIDENCE FOR 31/2 IN. DIAMETER TANK

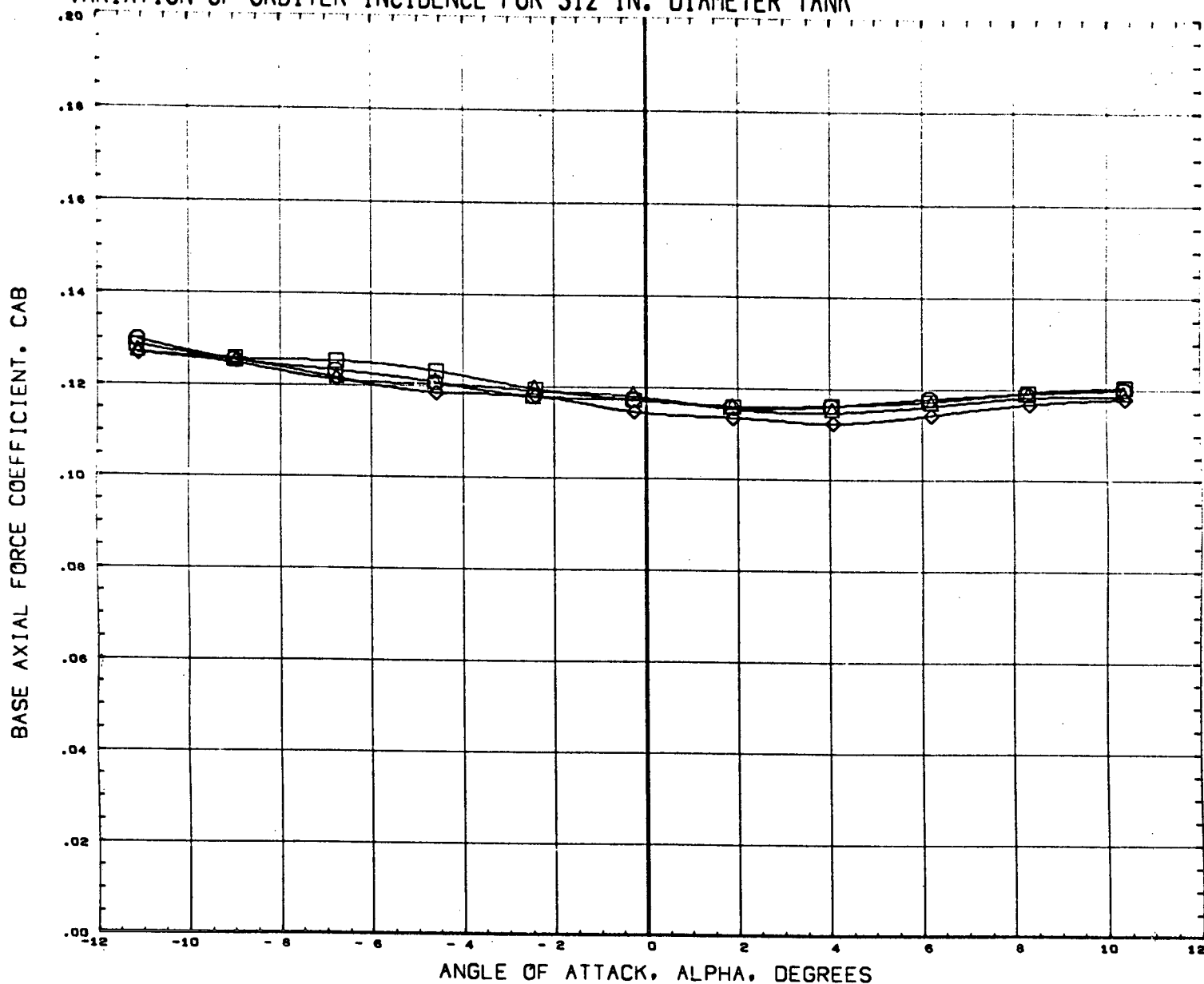


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

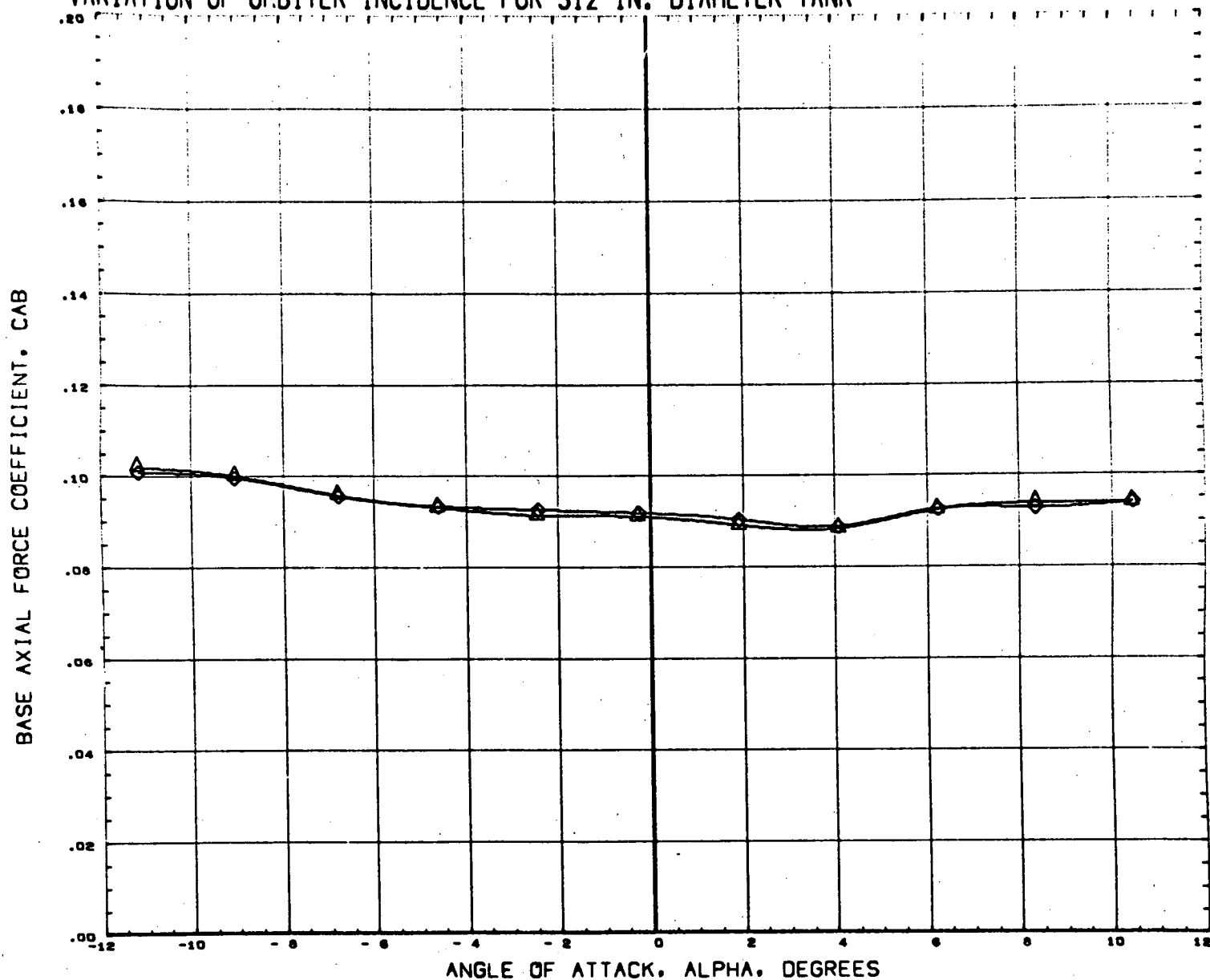


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

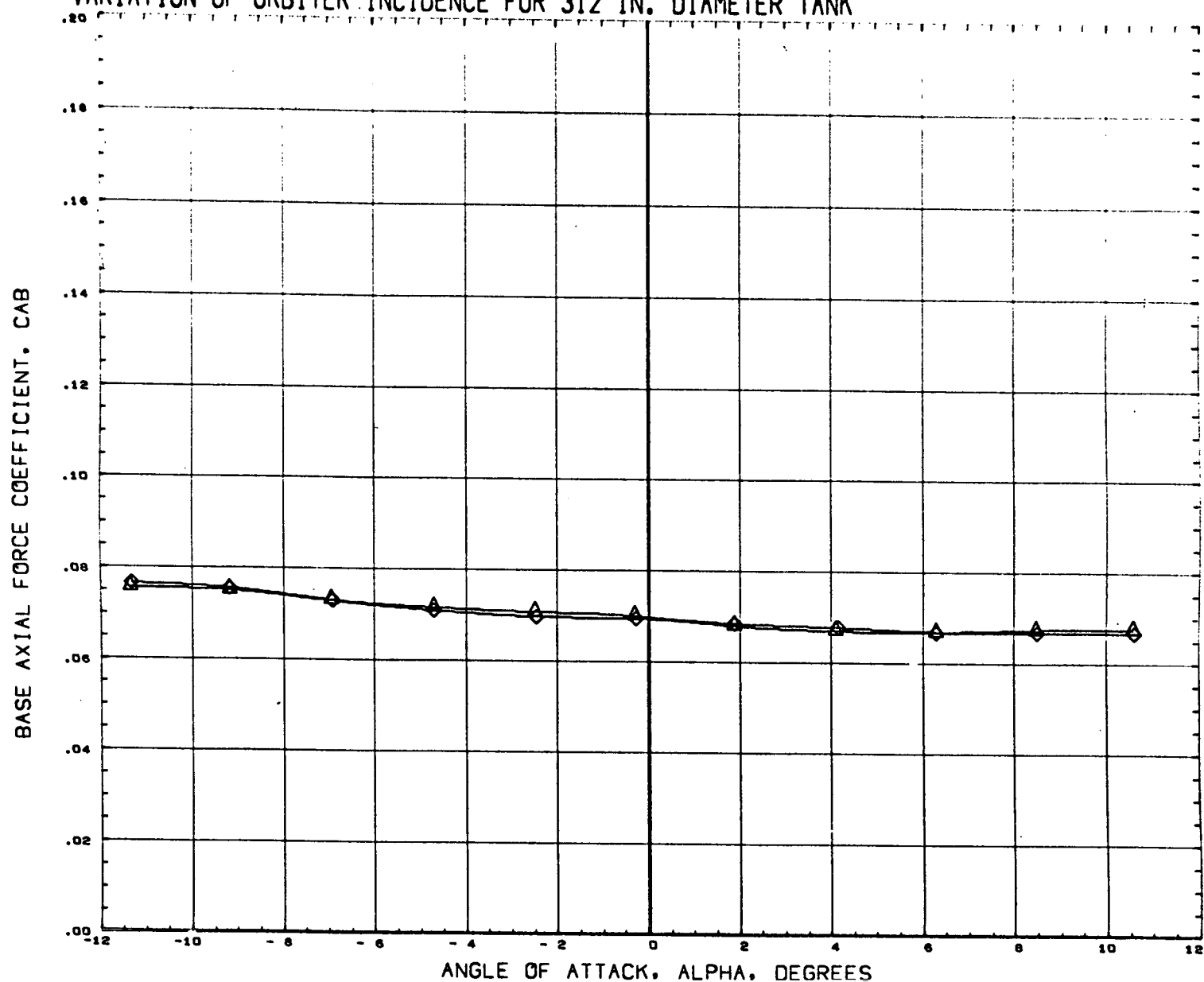


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMPP | 3.3600 IN. |
| | | | | | | YMPP | 0.0000 IN. |
| | | | | | | ZMPP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.47

PAGE 231

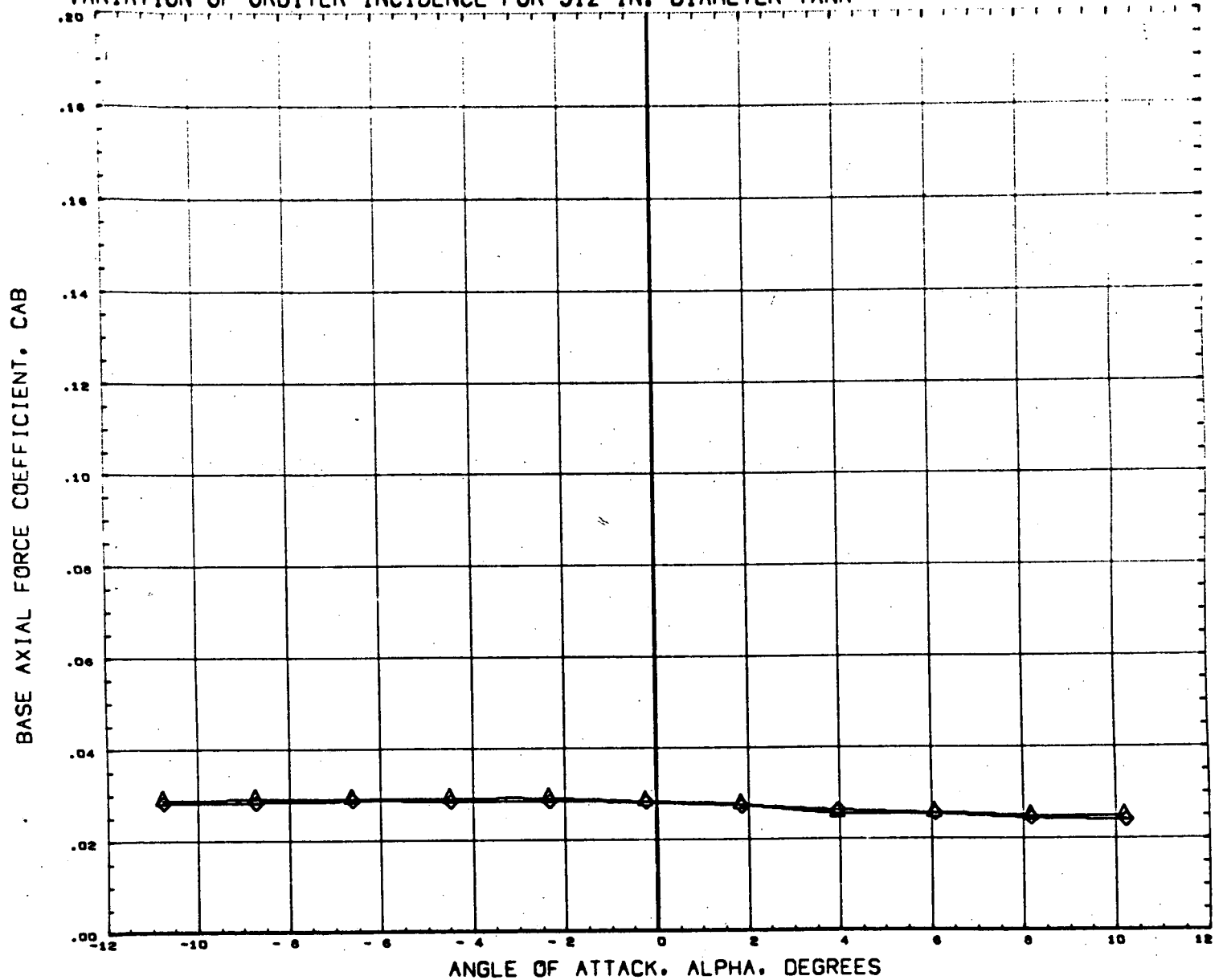
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



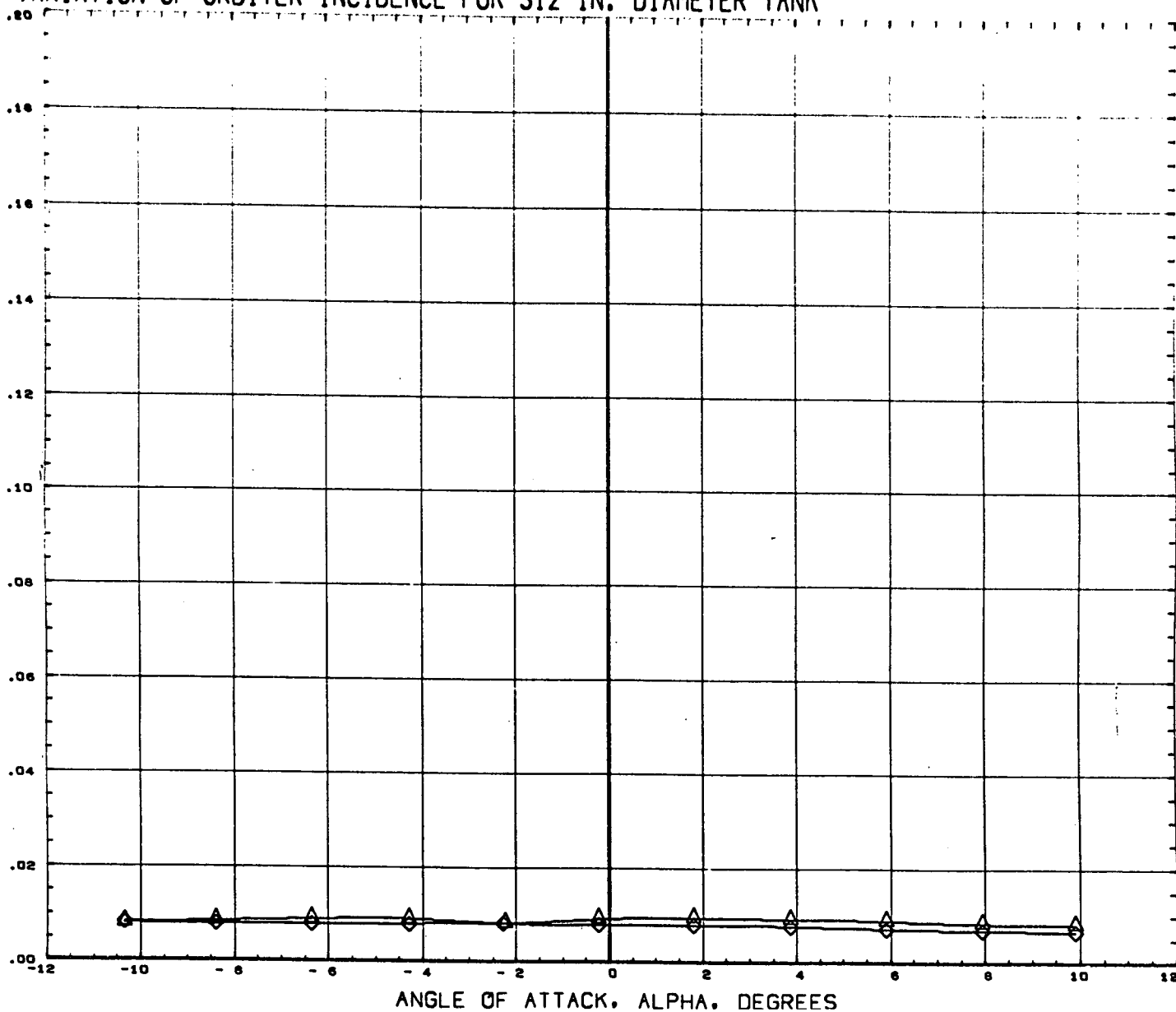
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
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| (B71133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

BASE AXIAL FORCE COEFFICIENT, CAB

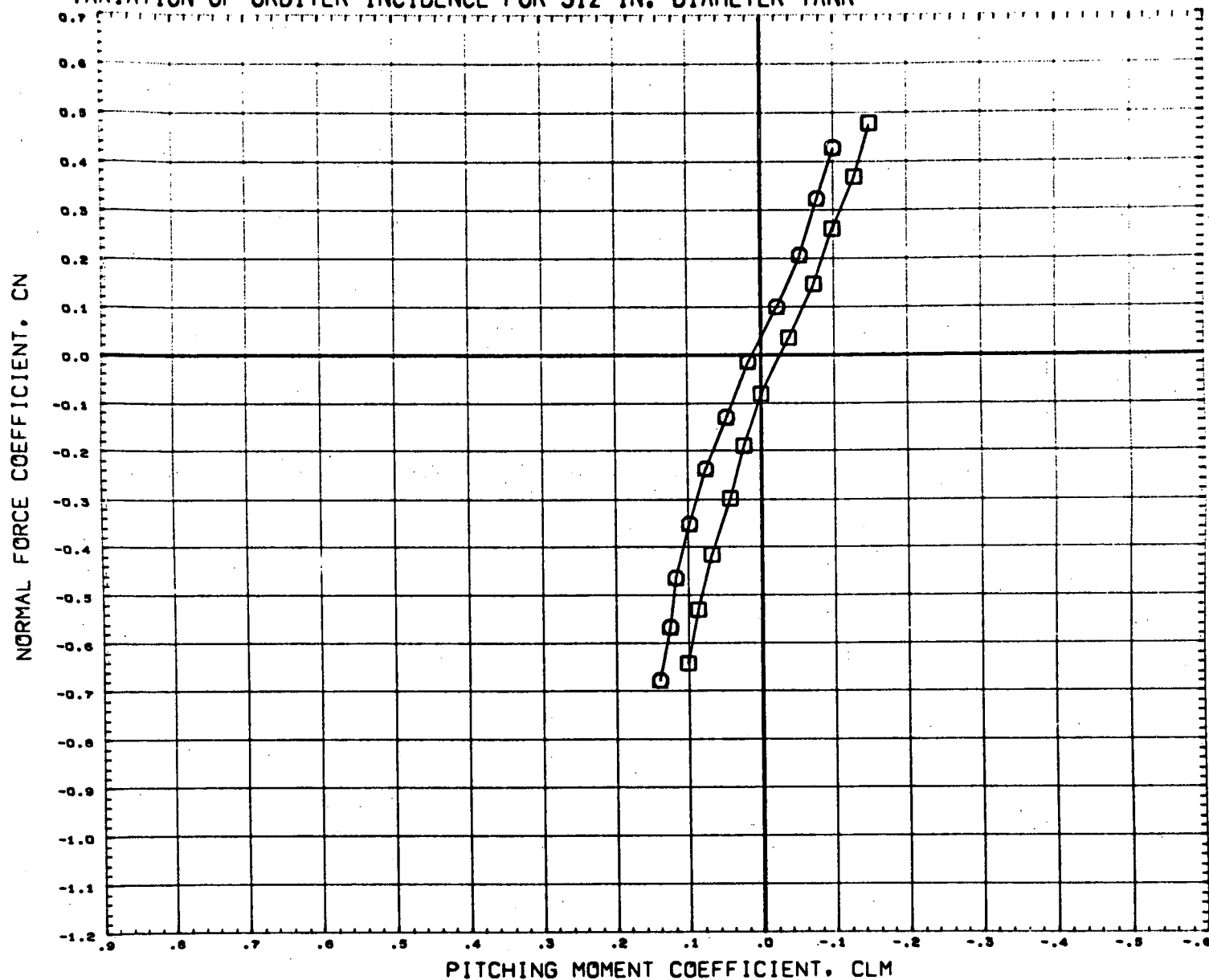


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

PAGE 234

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

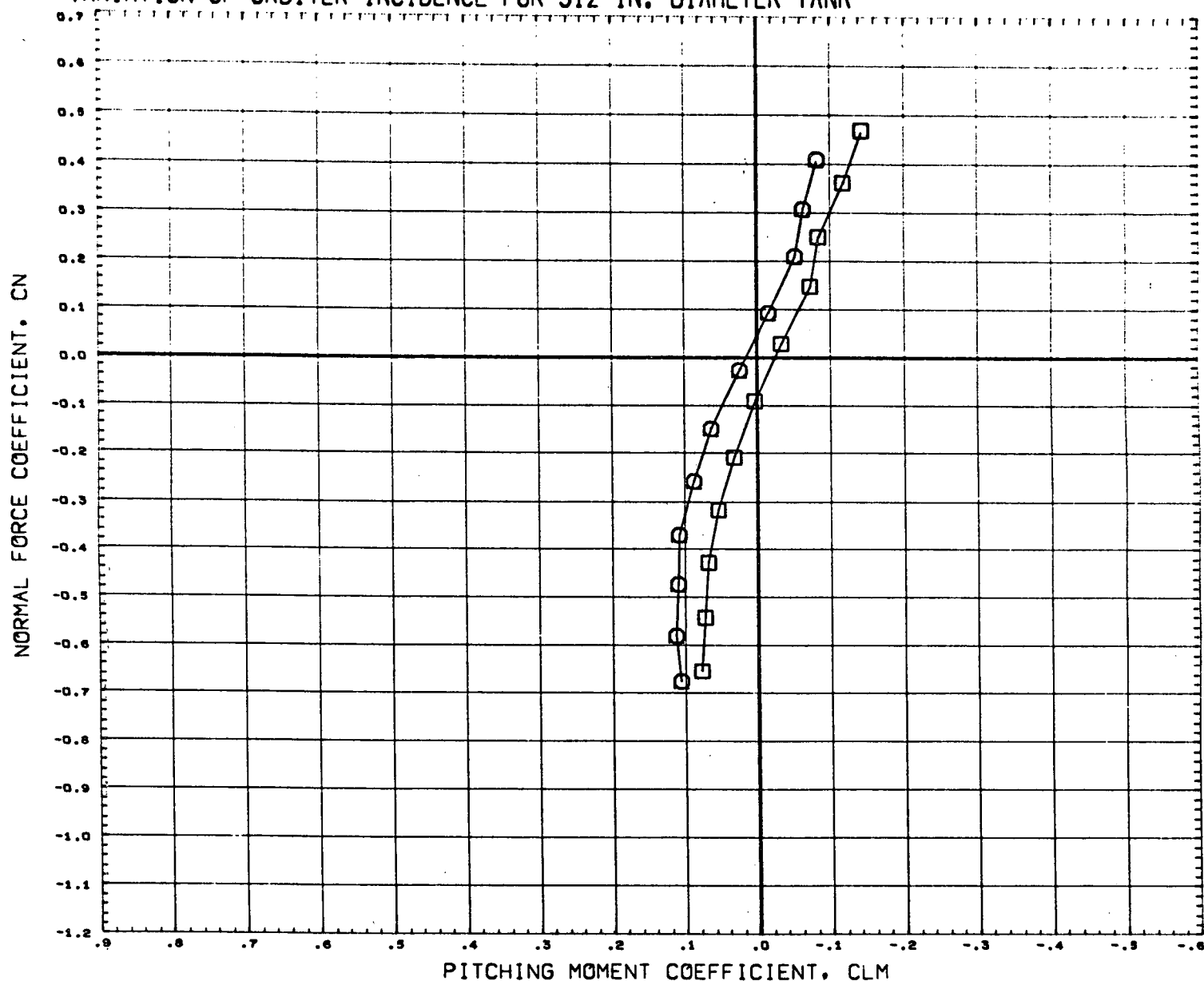


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 235

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

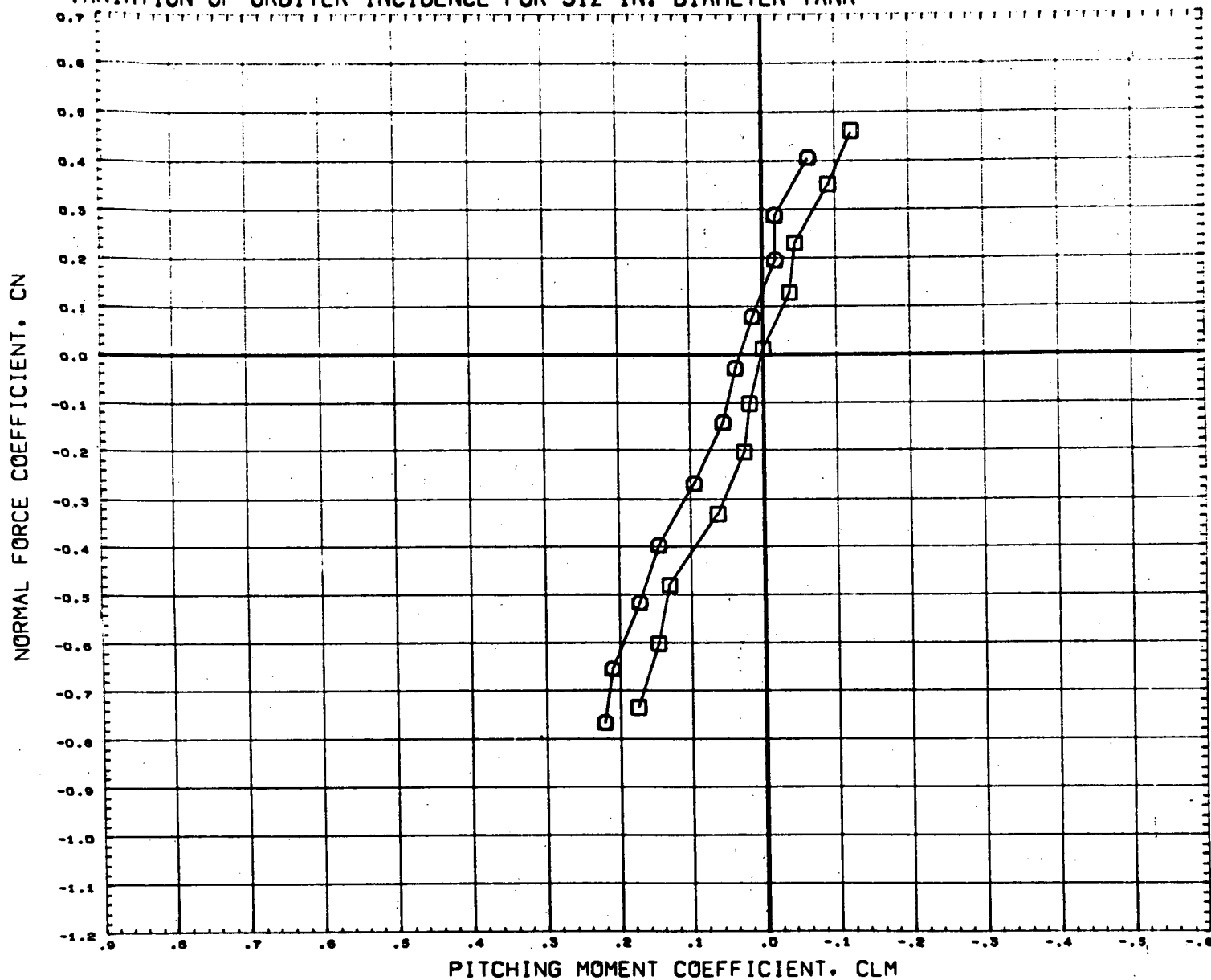


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

PAGE 236

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



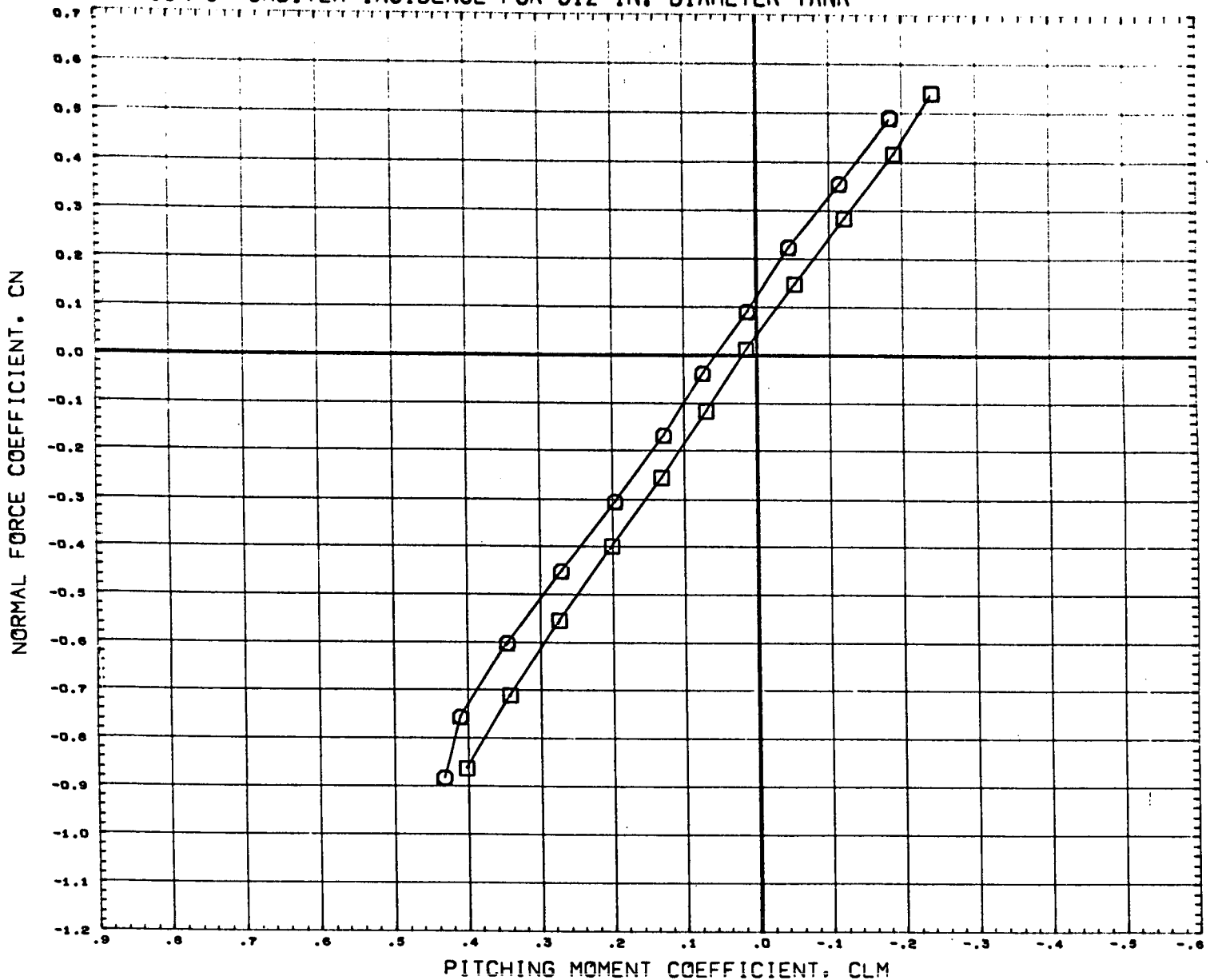
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 30. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.91

PAGE 237

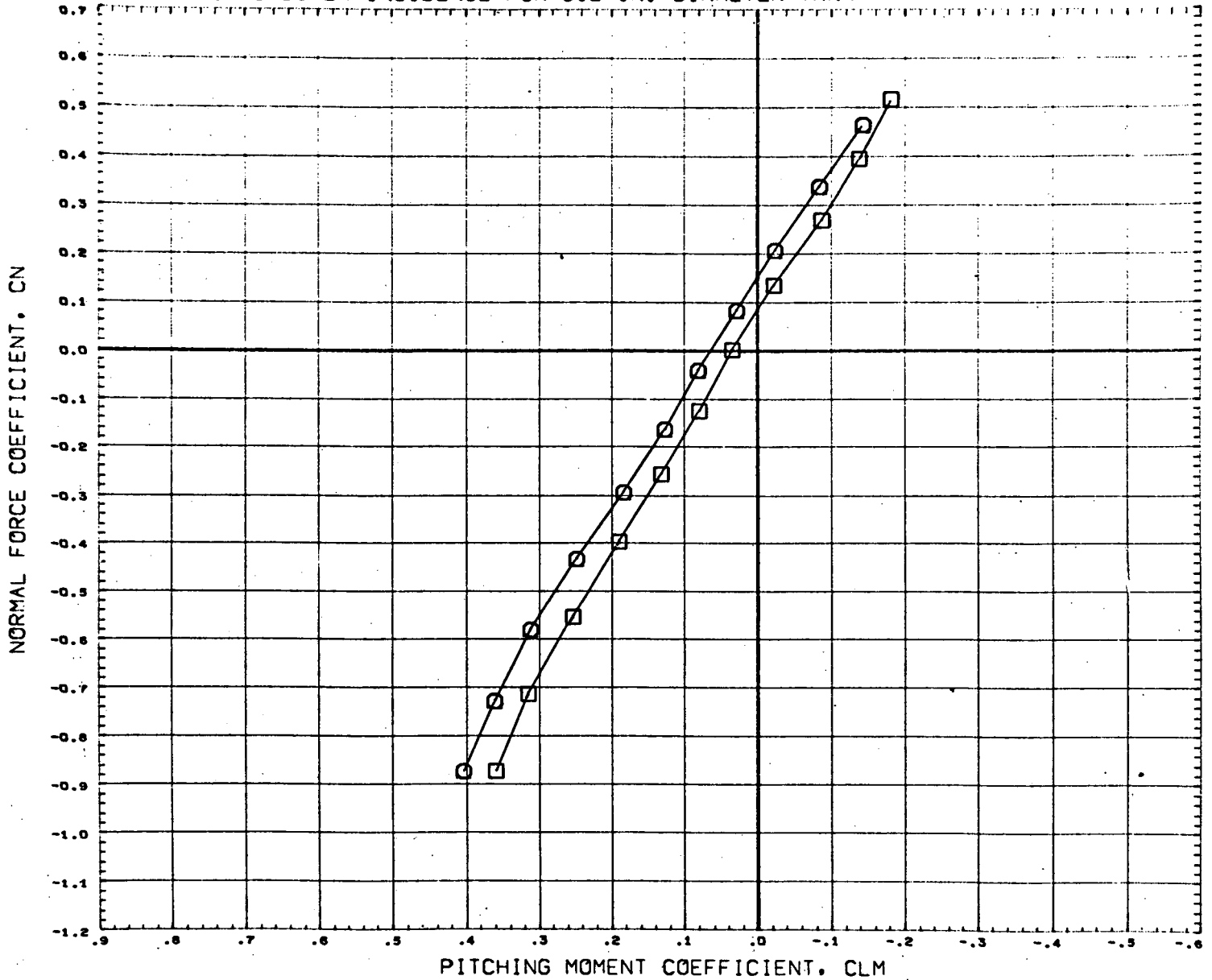
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

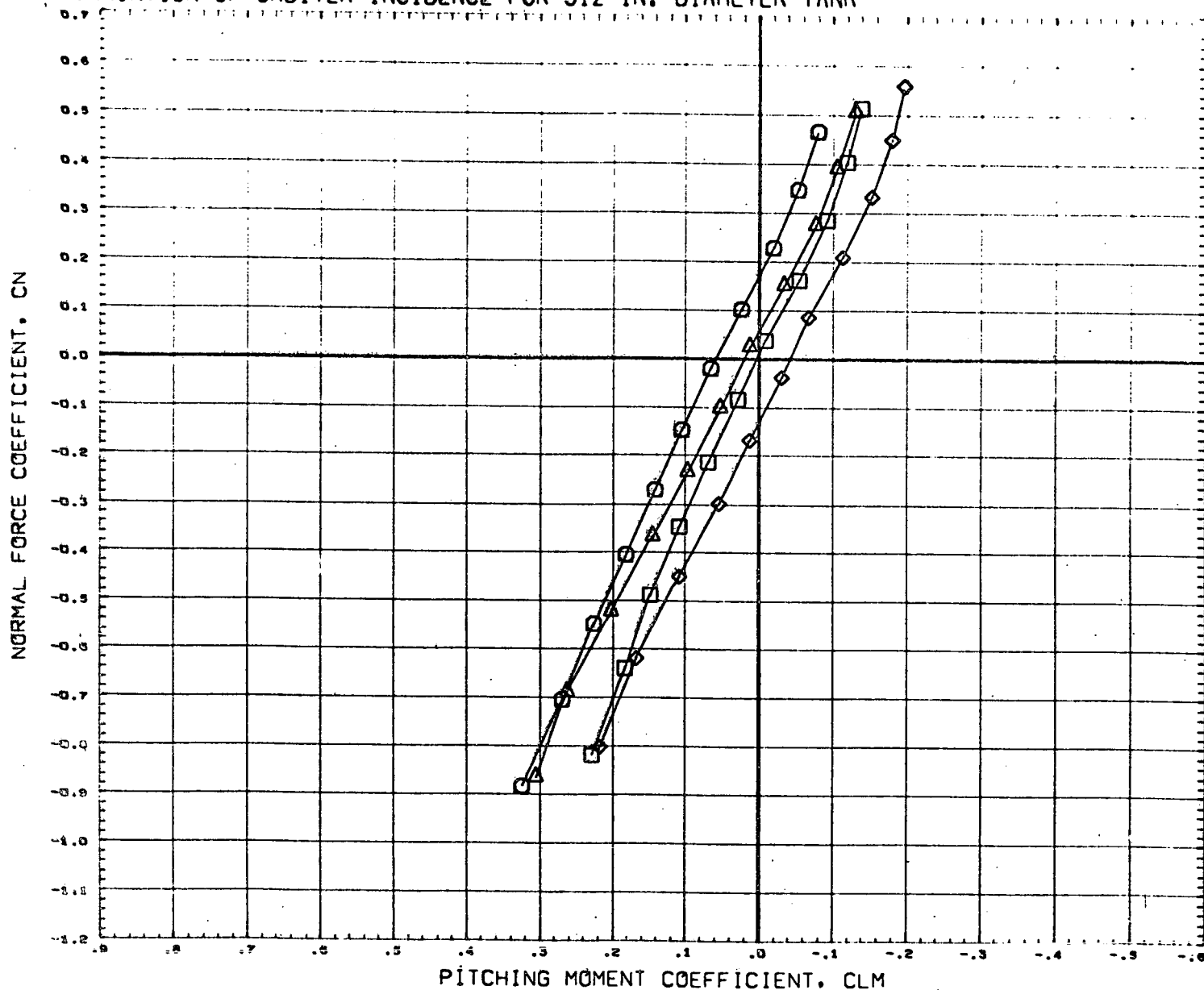


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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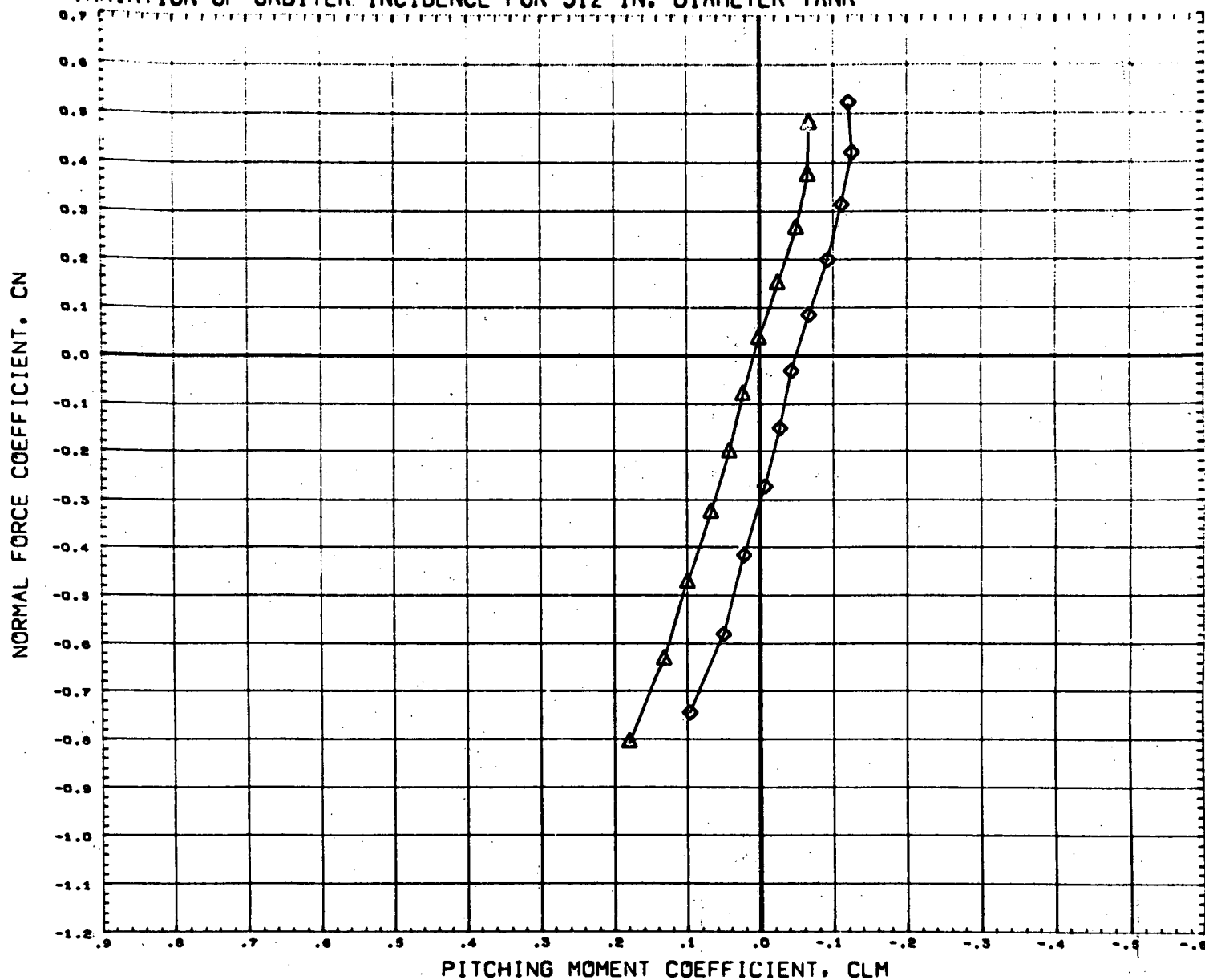
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

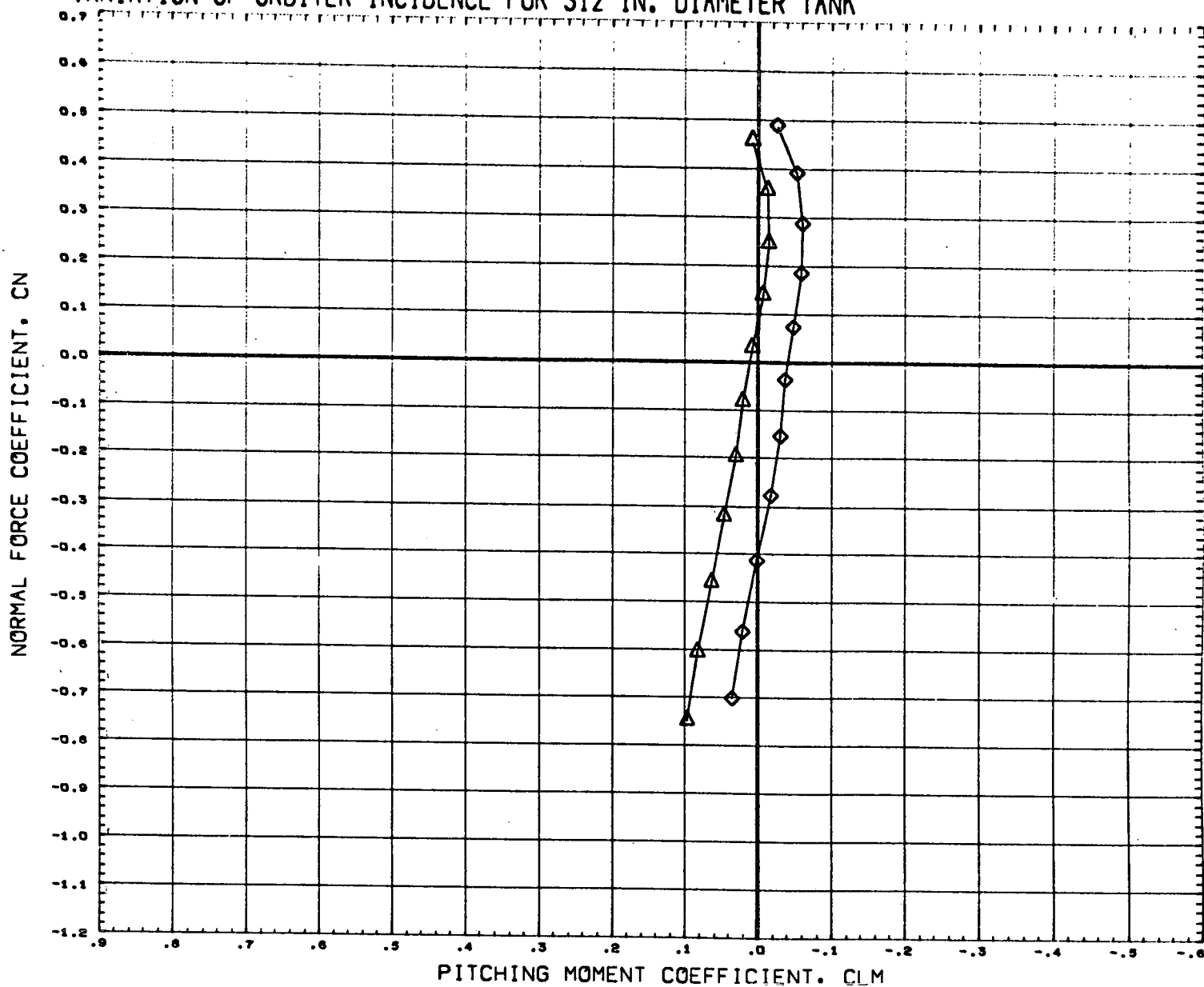
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.47

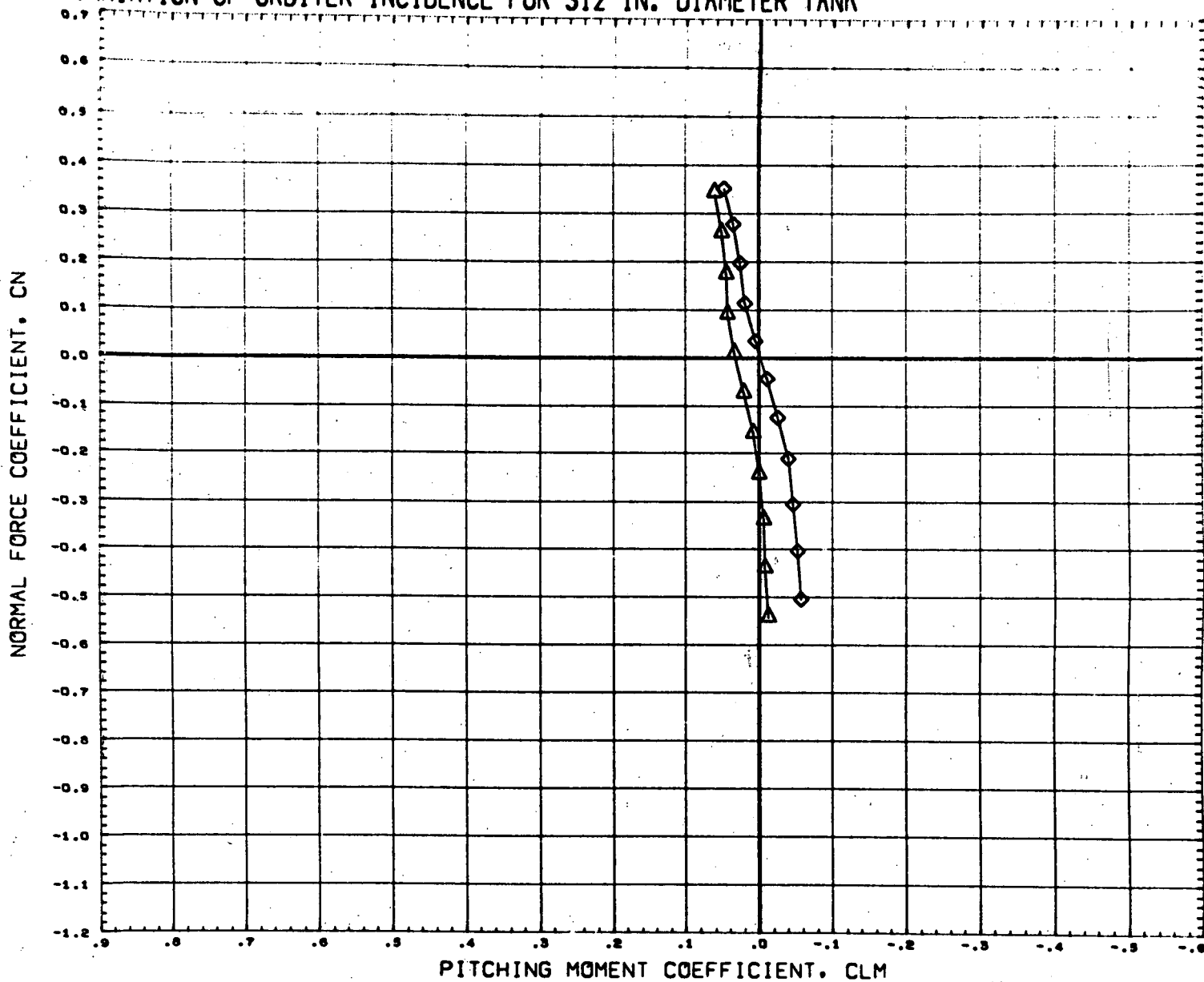
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

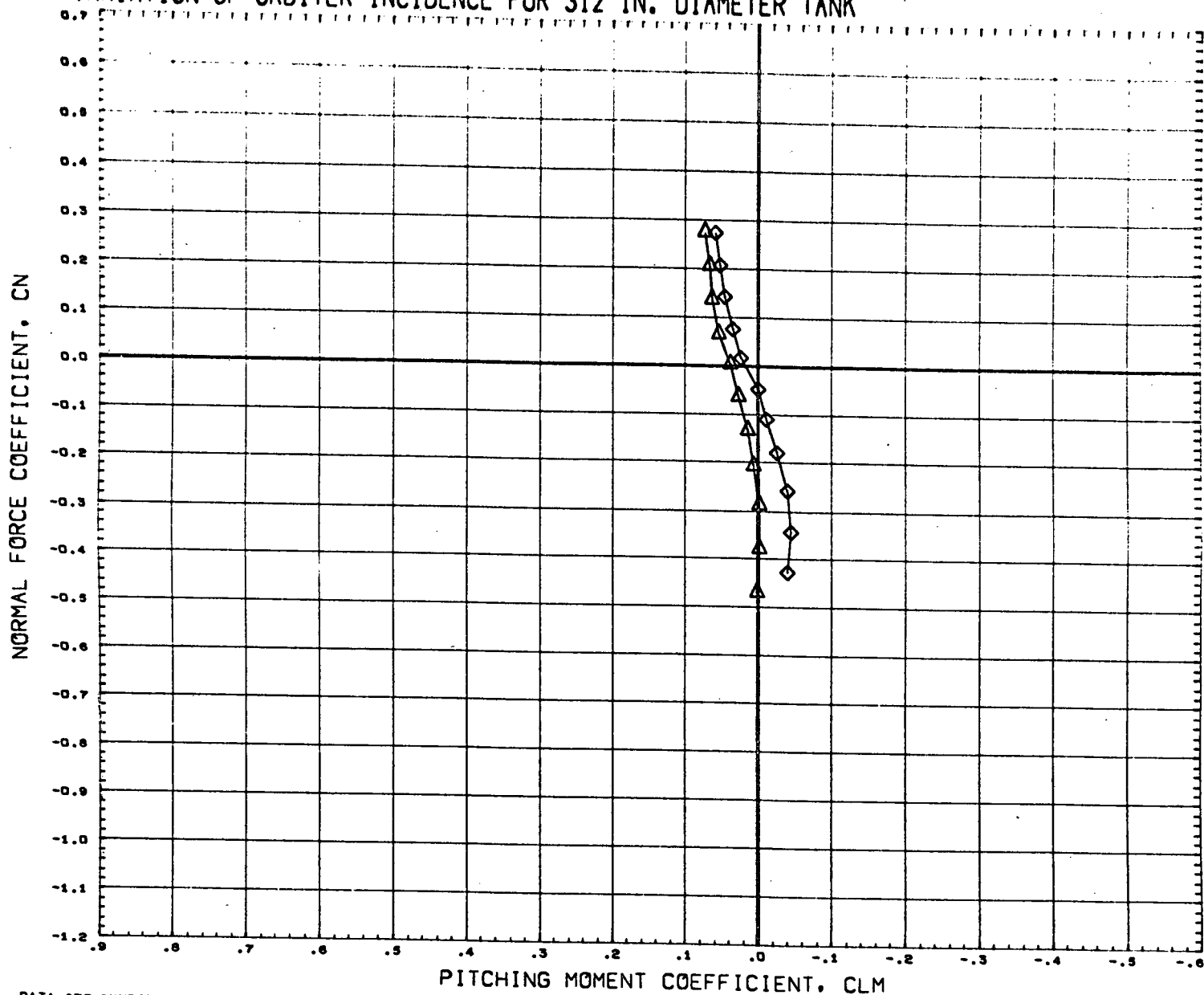
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8000 SQ. IN. |
| (B71131) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

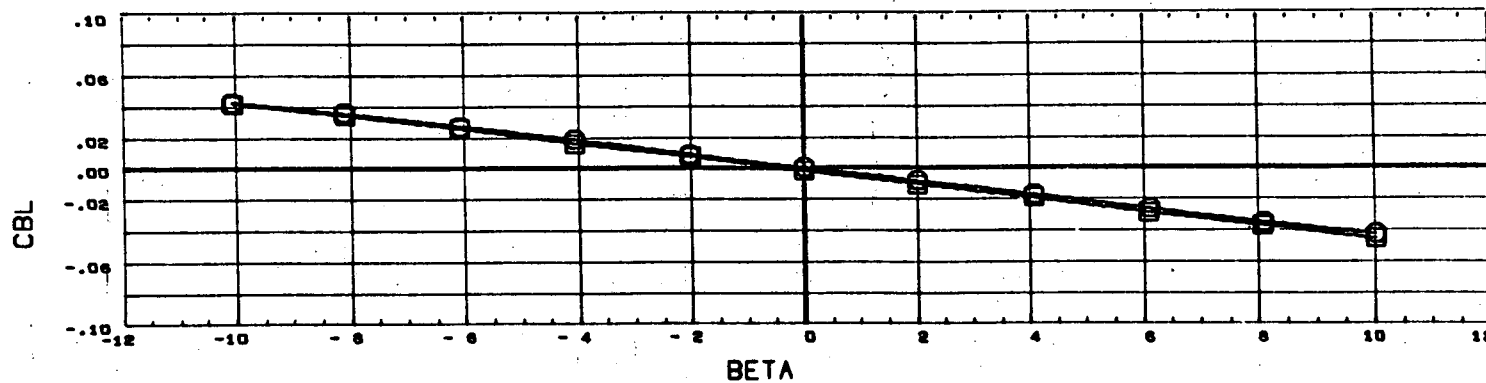
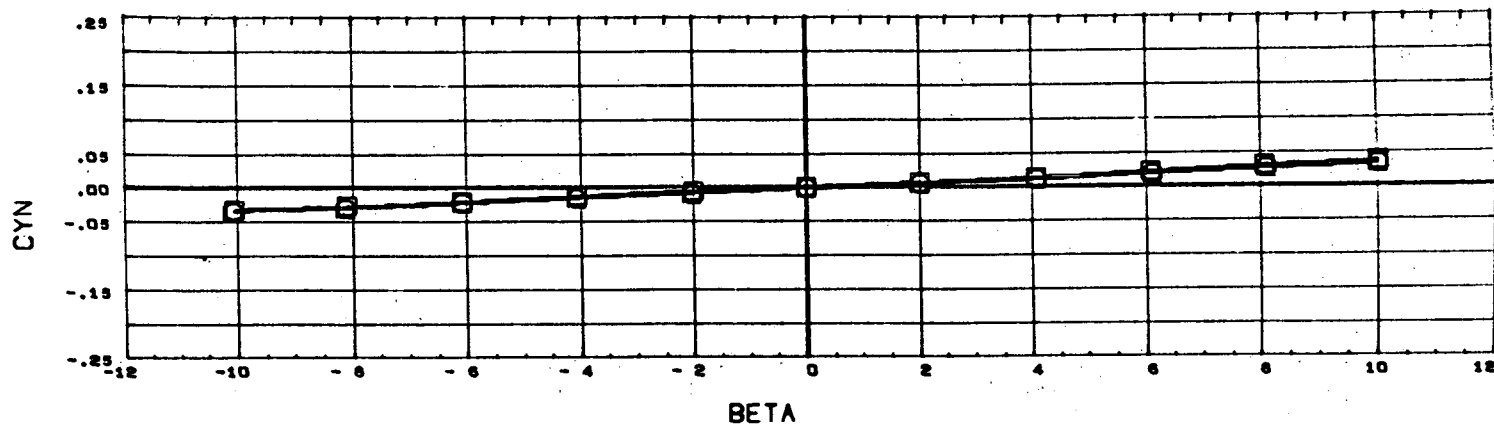
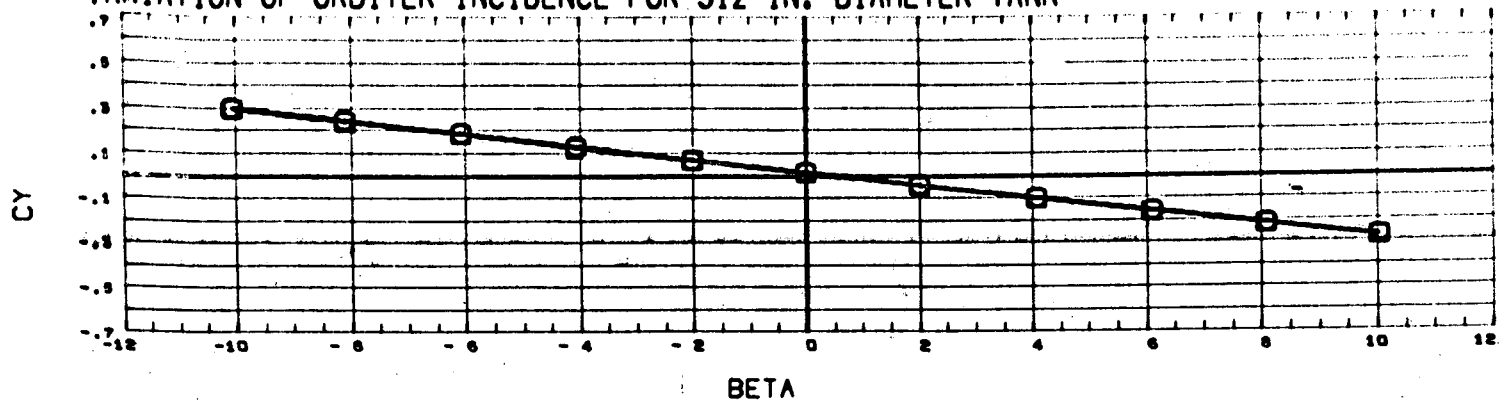
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET | SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|----------|--------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71129) | ○ | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71131) | △ | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71133) | ◇ | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71135) | □ | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | | YMRP | 0.0000 IN. |
| | | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

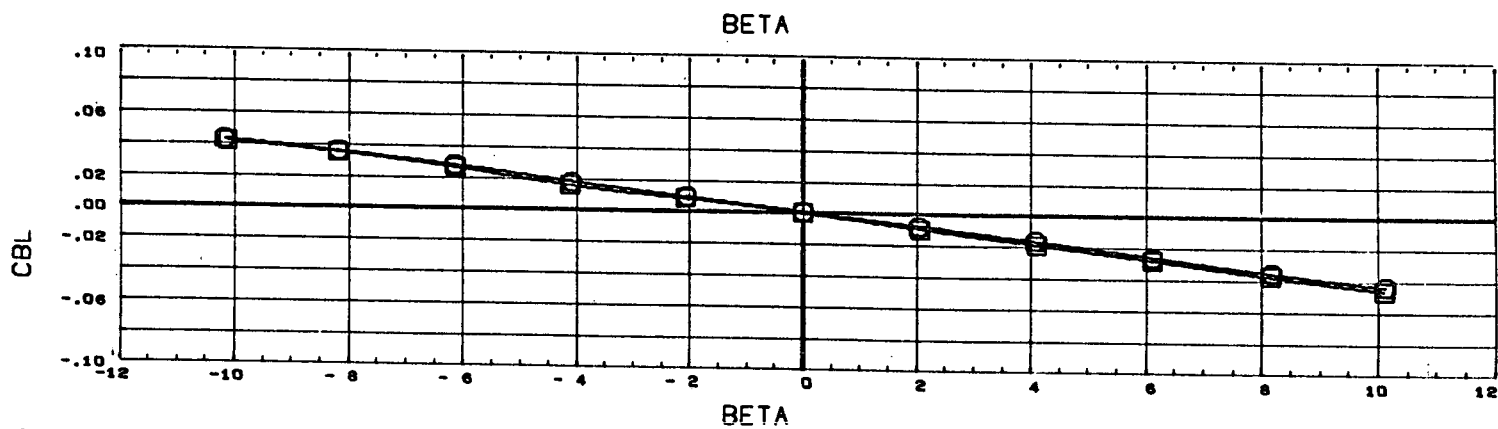
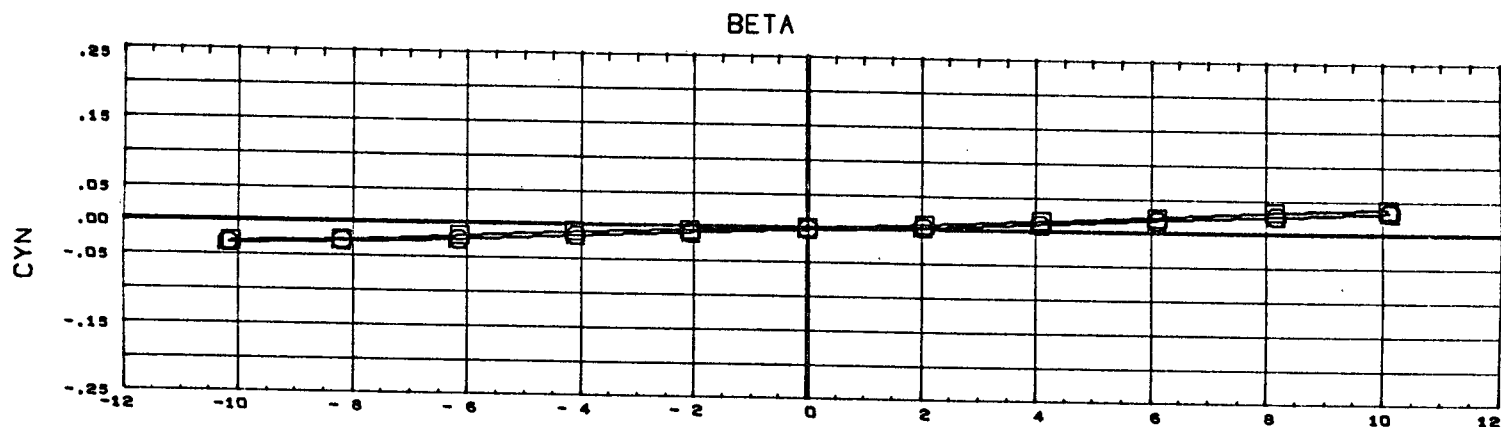
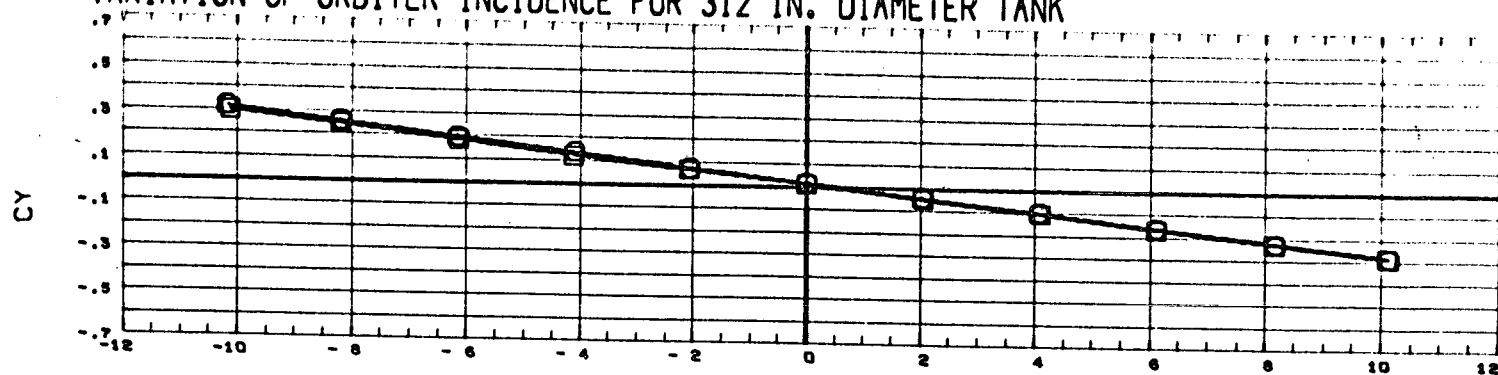
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71132) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

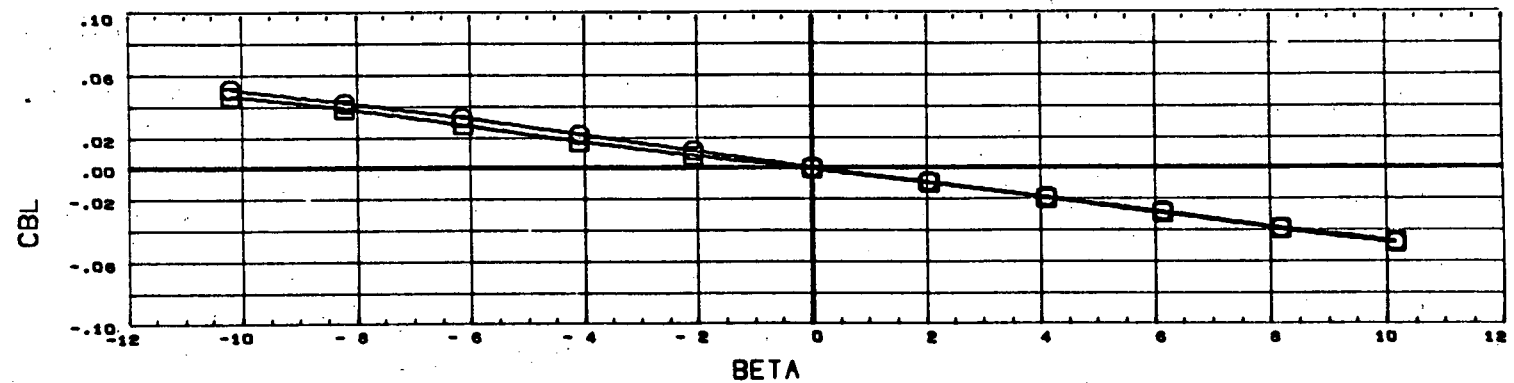
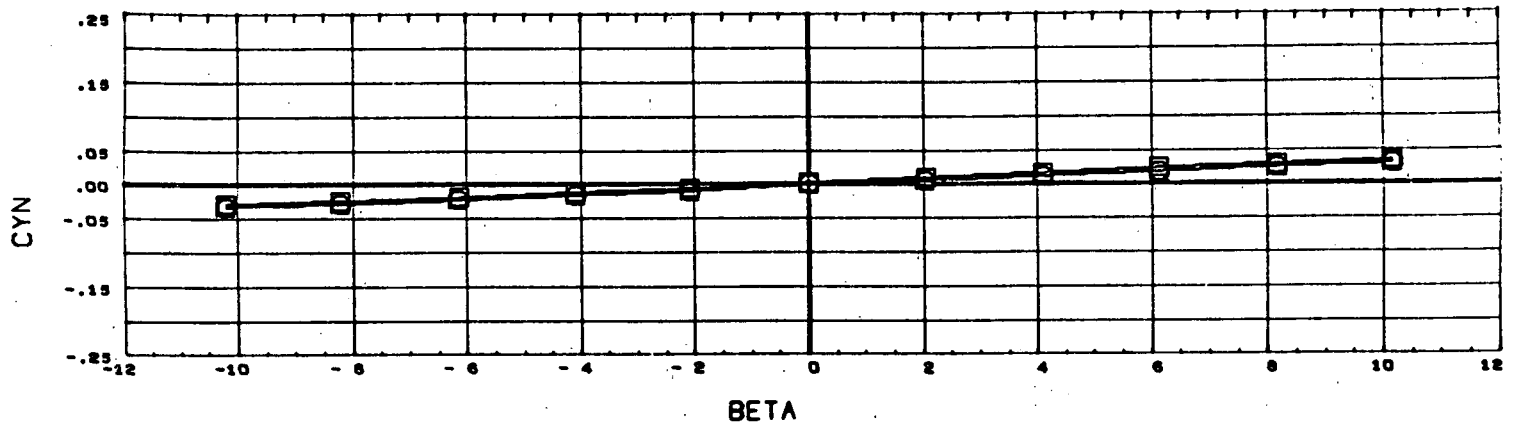
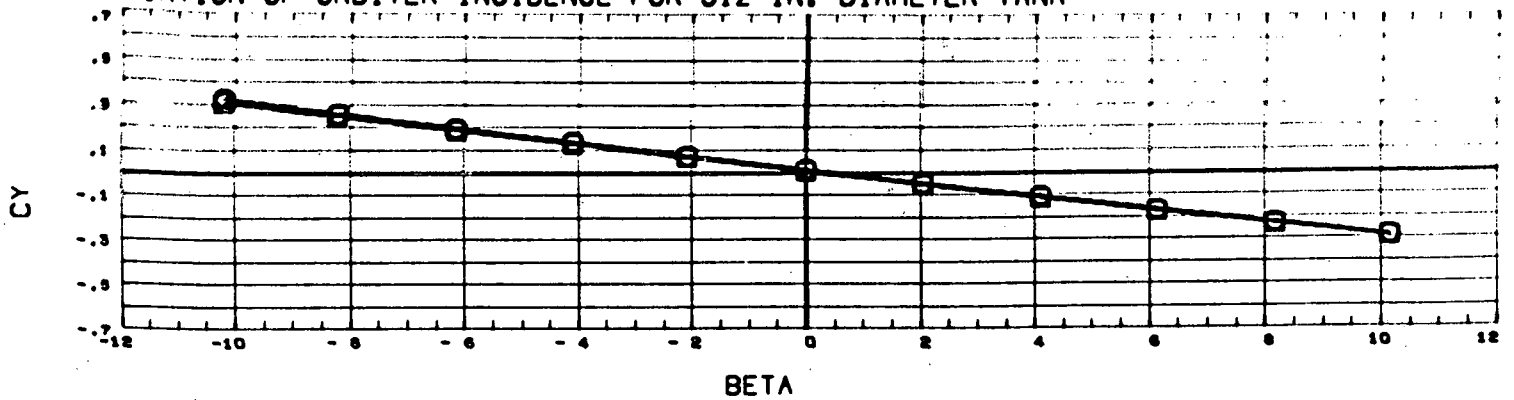
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71132) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

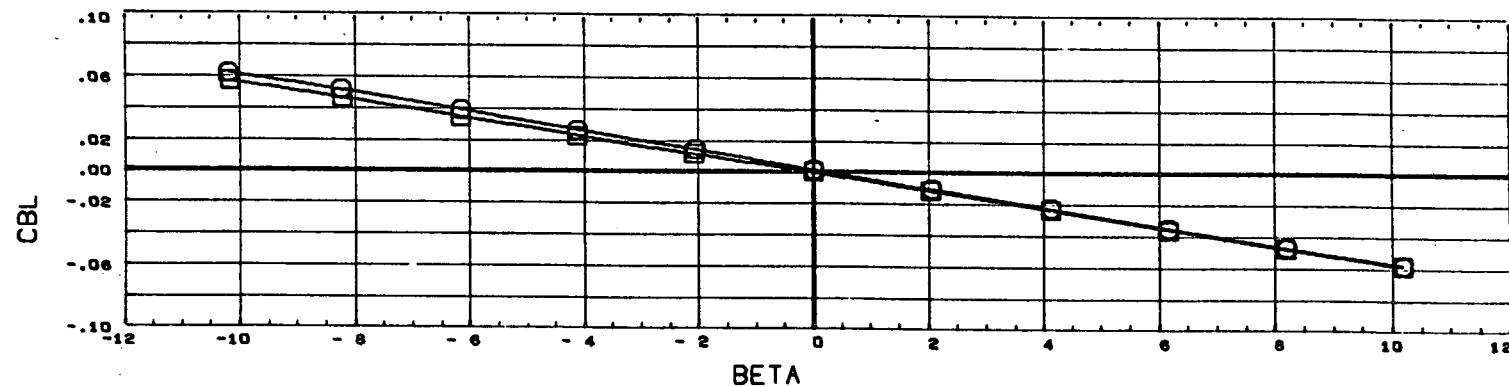
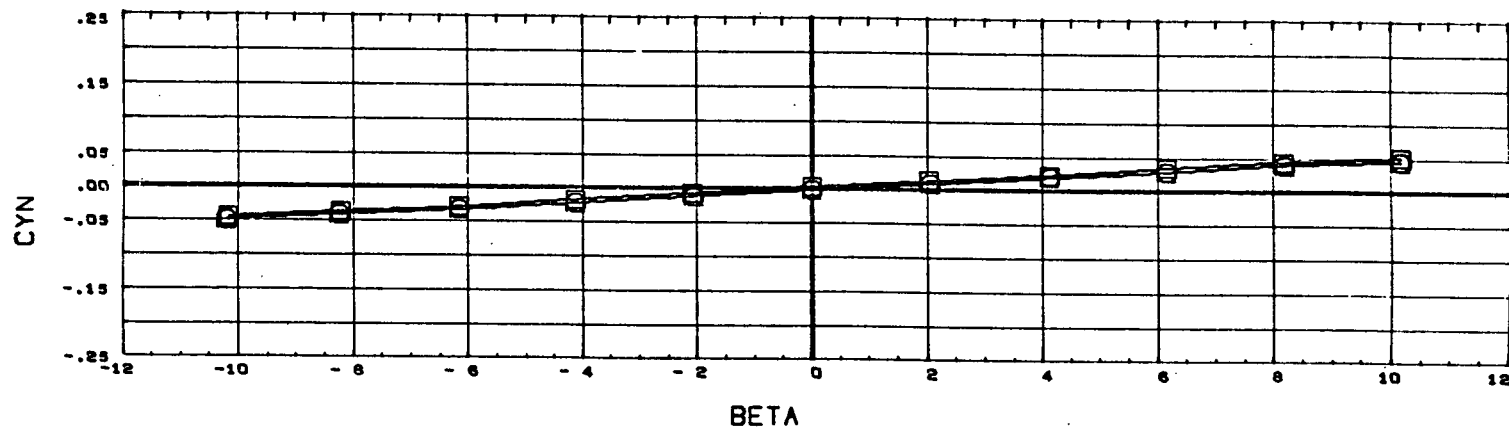
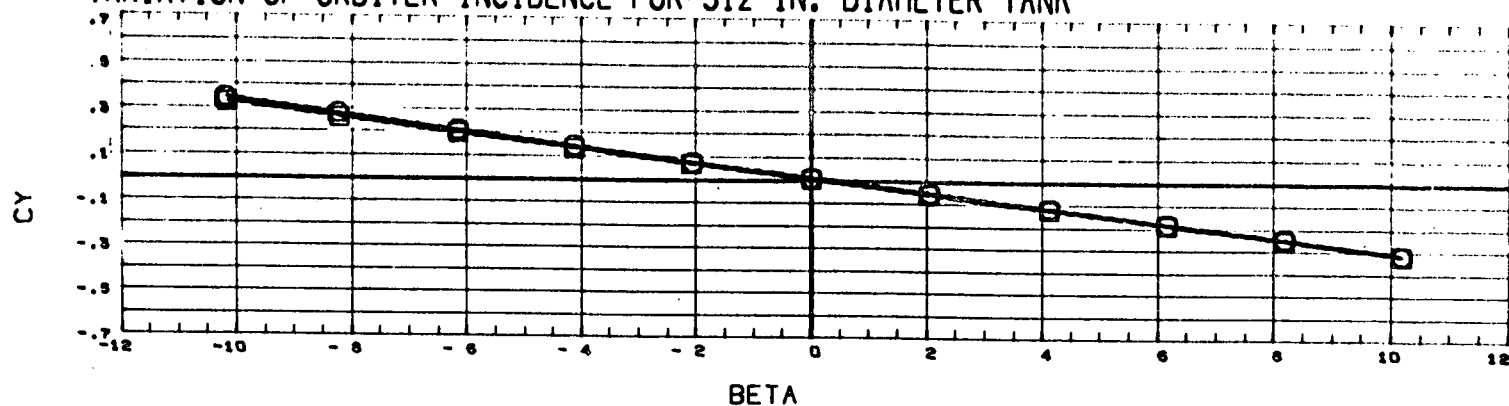
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 50. IN. |
| (A71132) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XNRP | 3.3600 IN. |
| | | | | | | YNRP | 0.0000 IN. |
| | | | | | | ZNRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

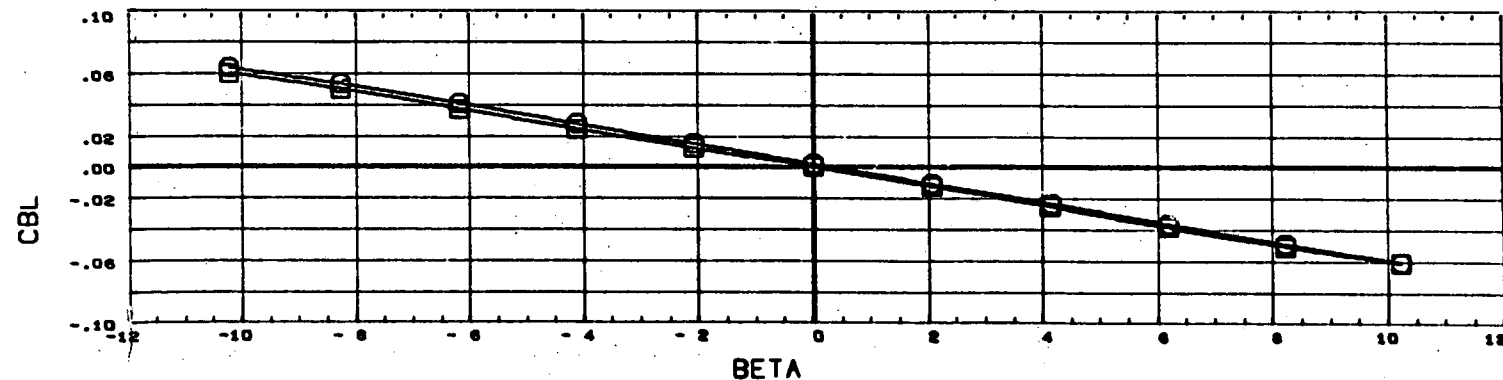
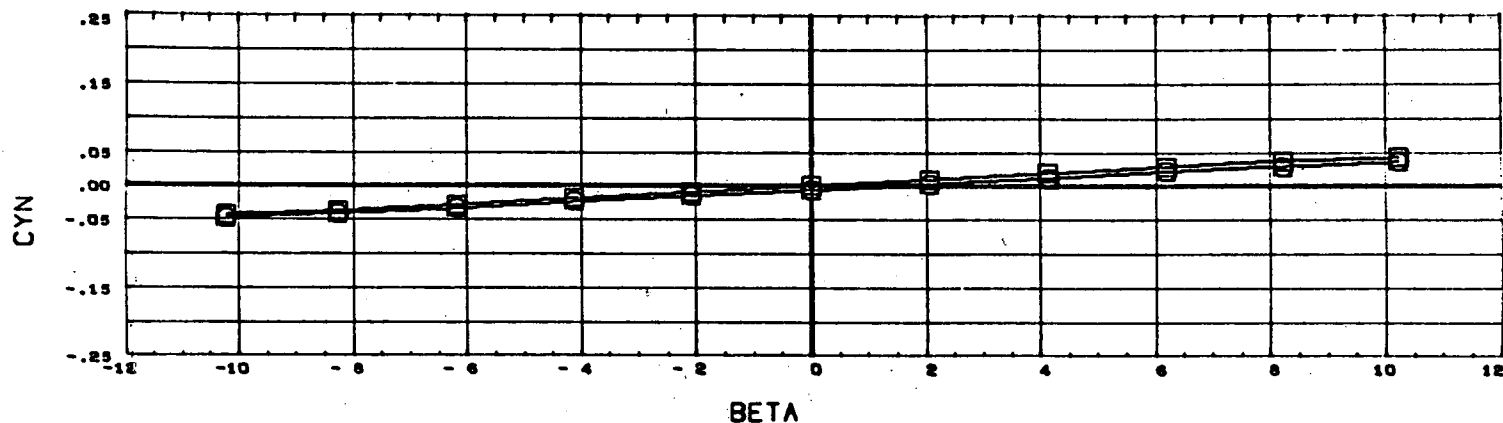
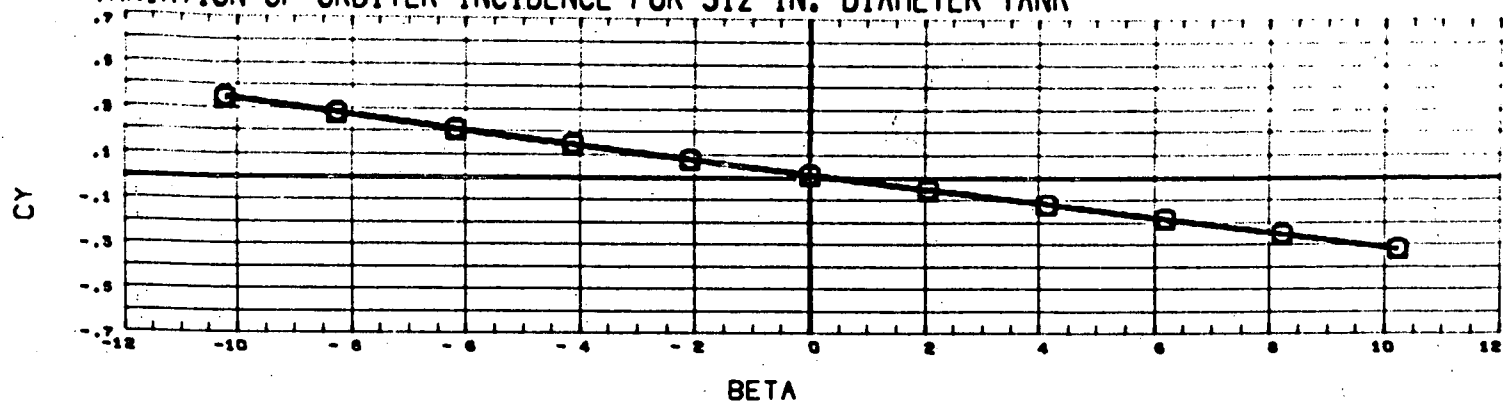


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71132) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



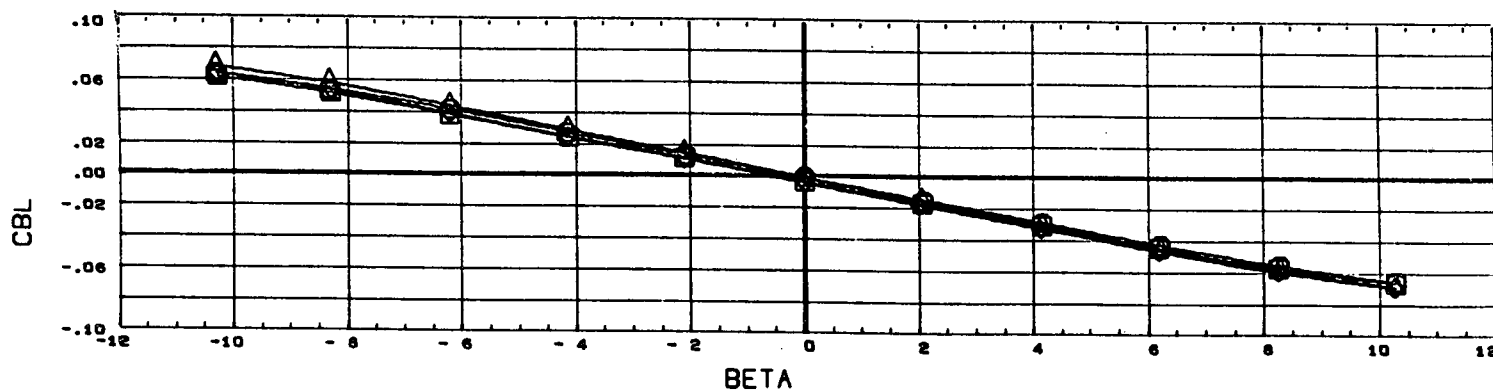
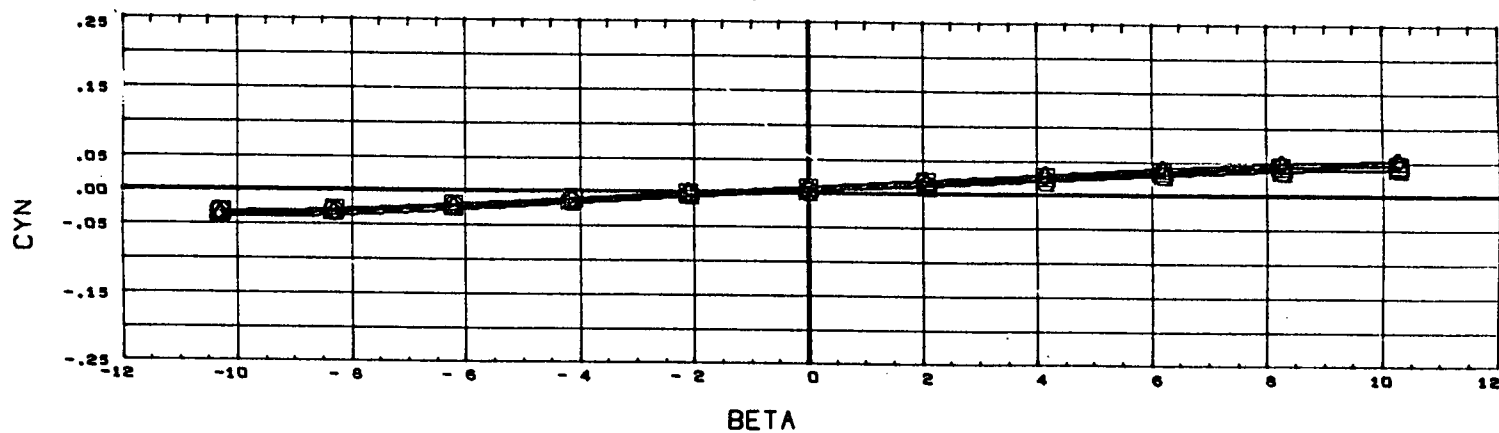
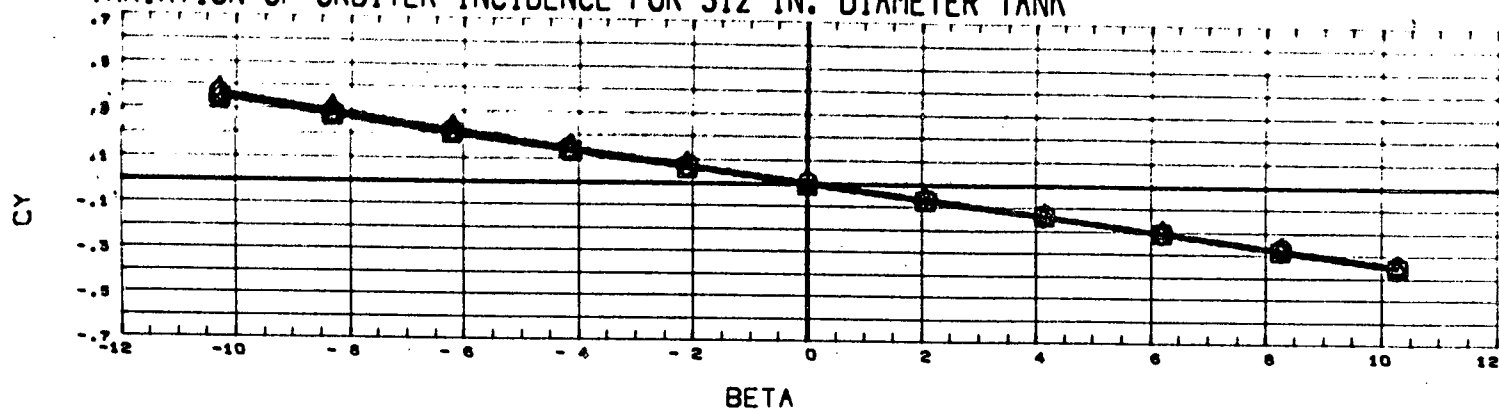
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (A71132) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.10

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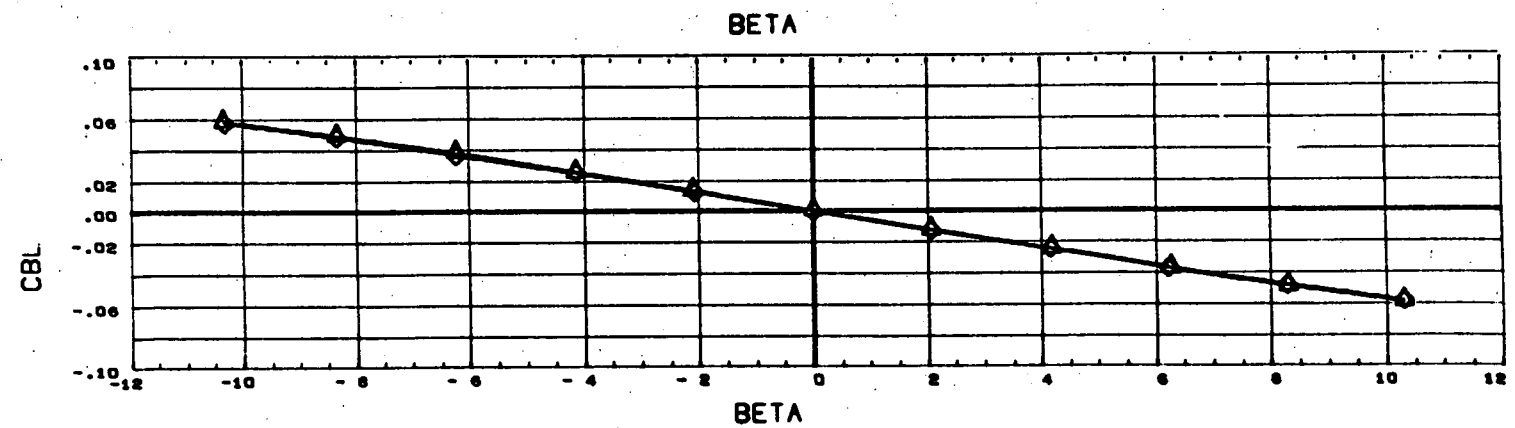
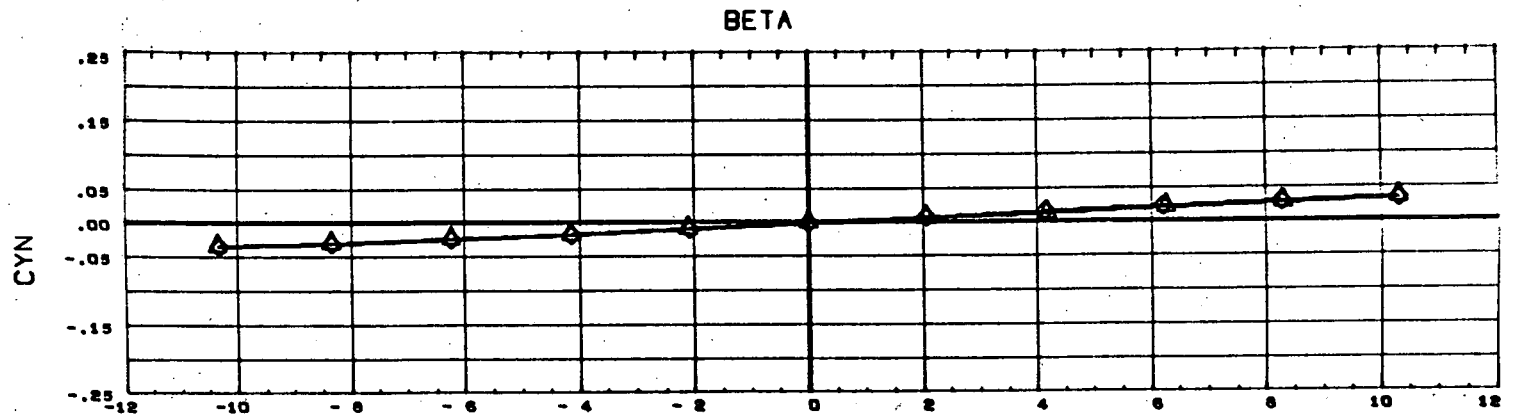
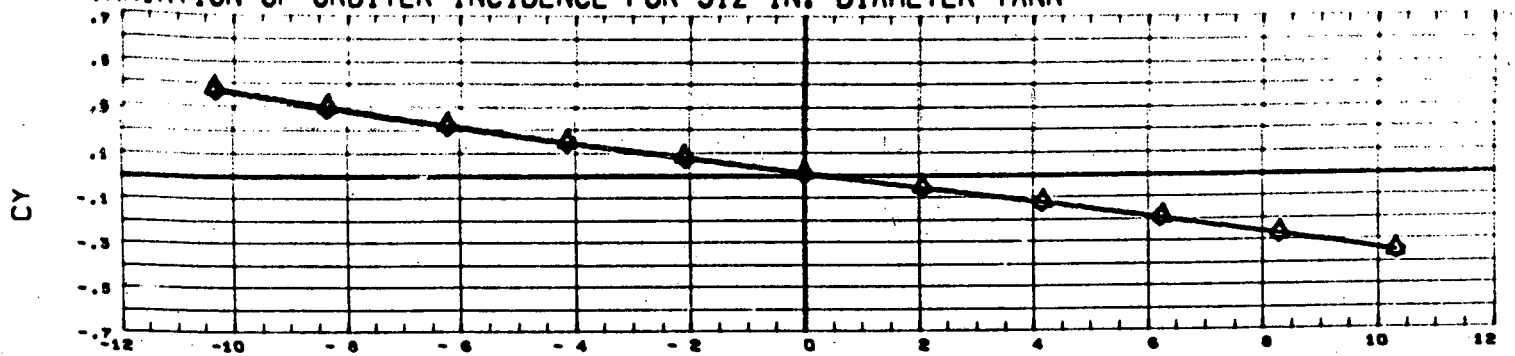
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71132) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

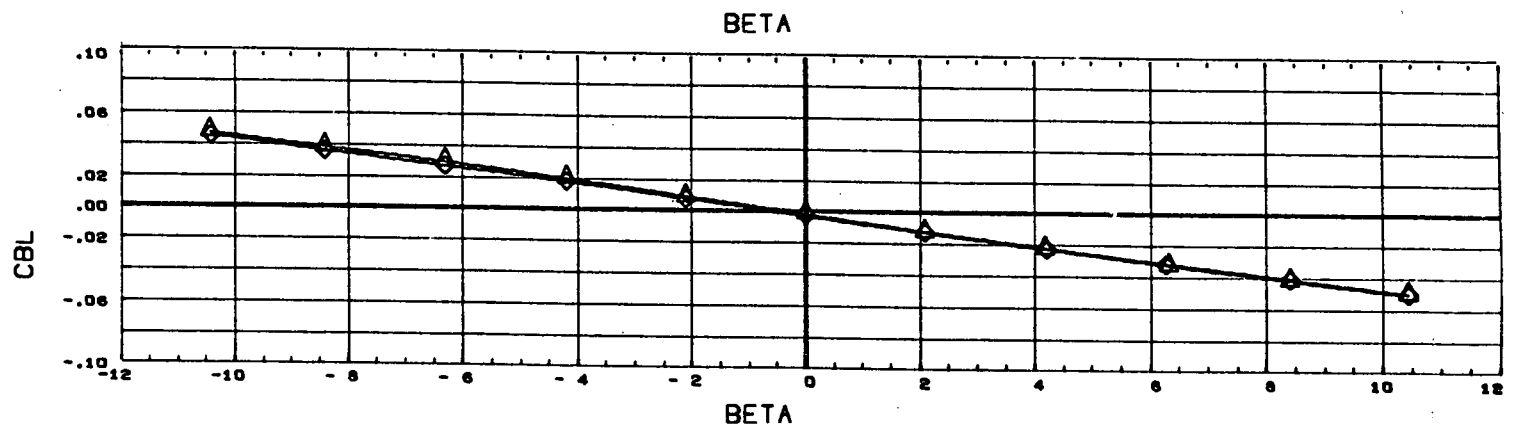
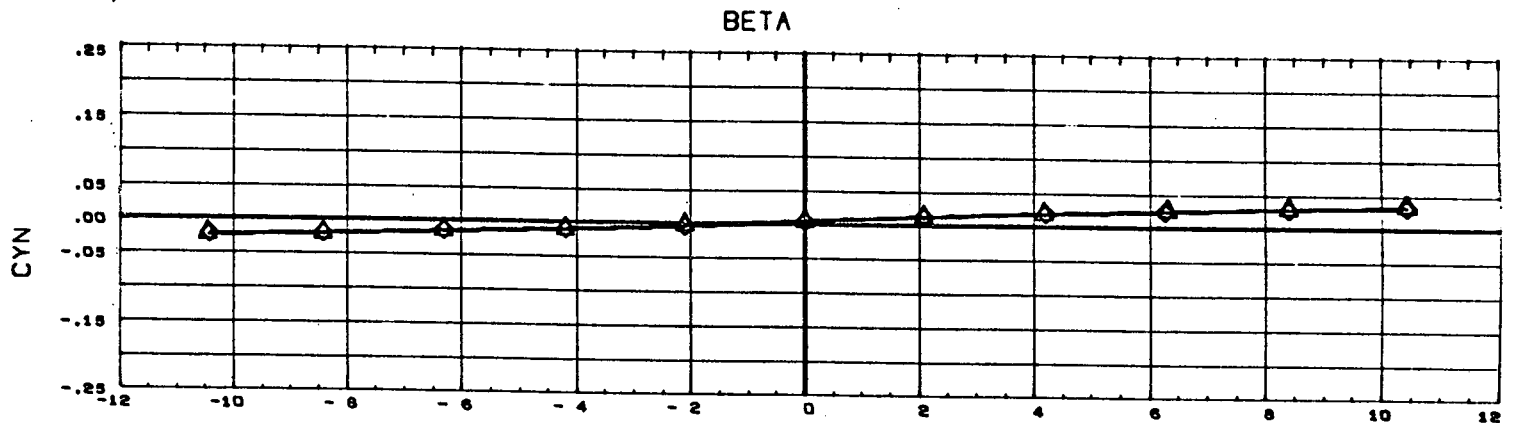
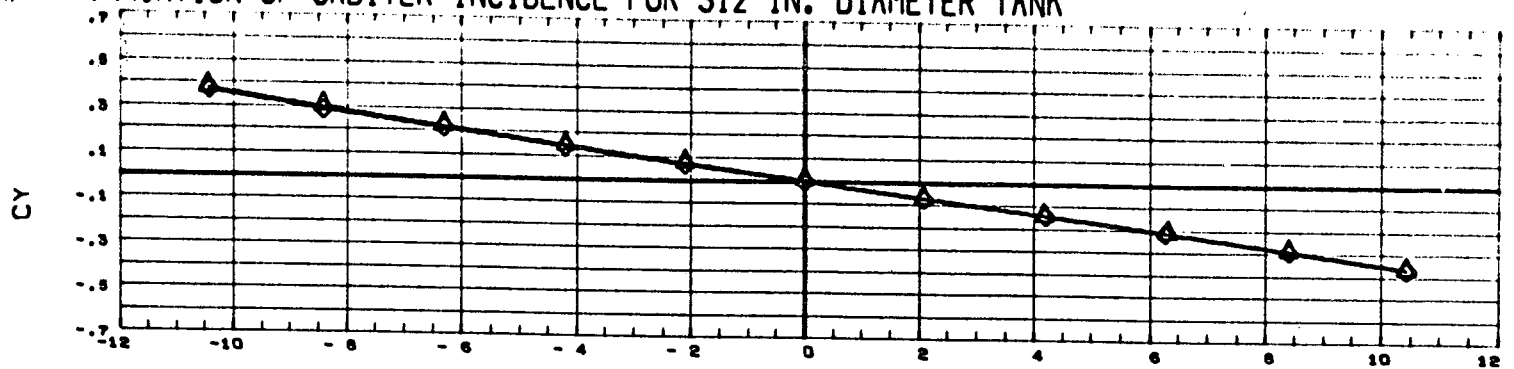
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71132) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.45

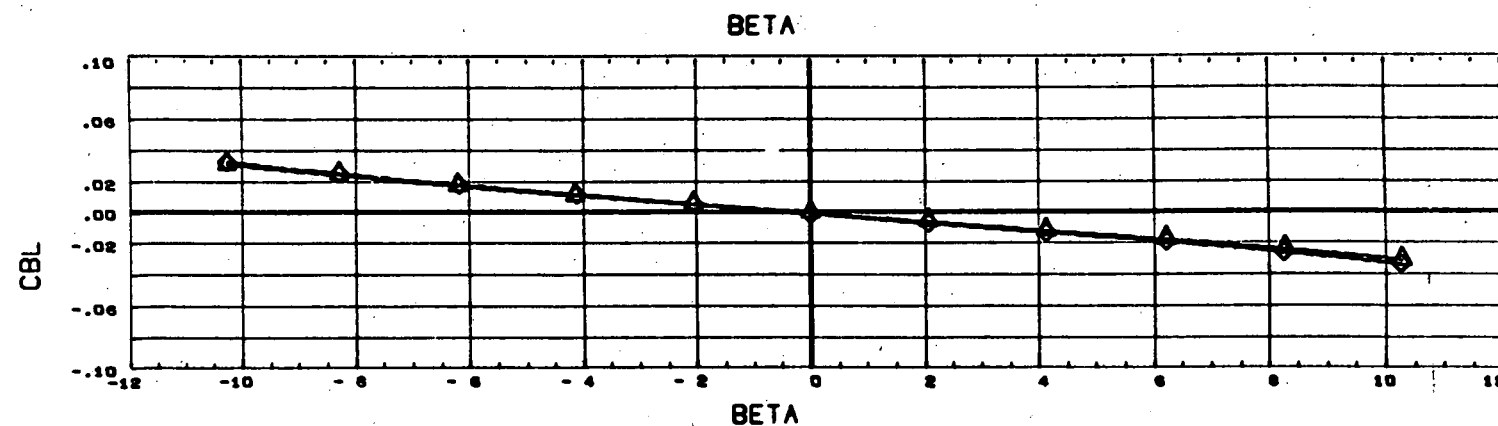
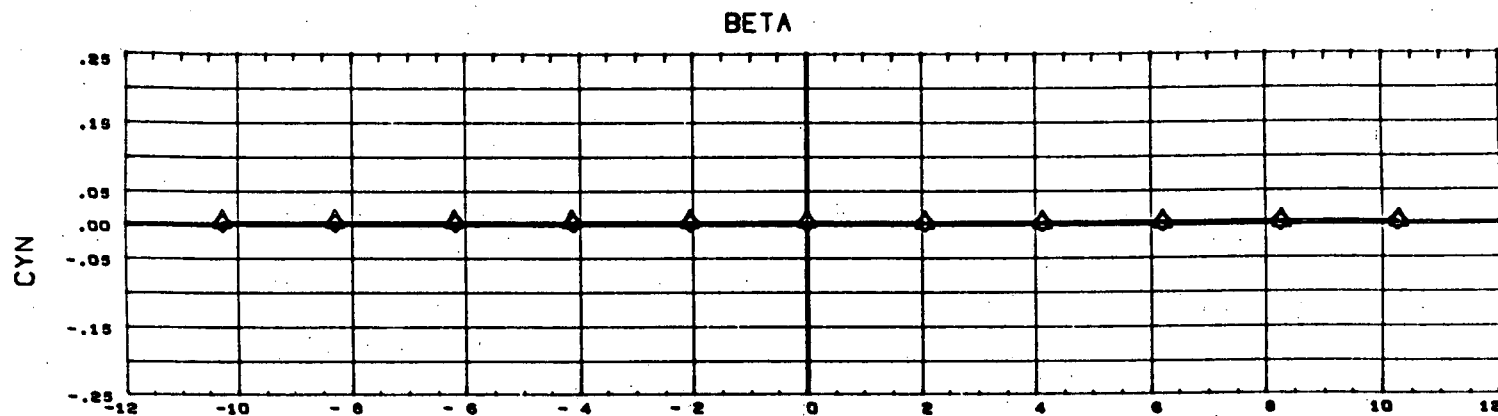
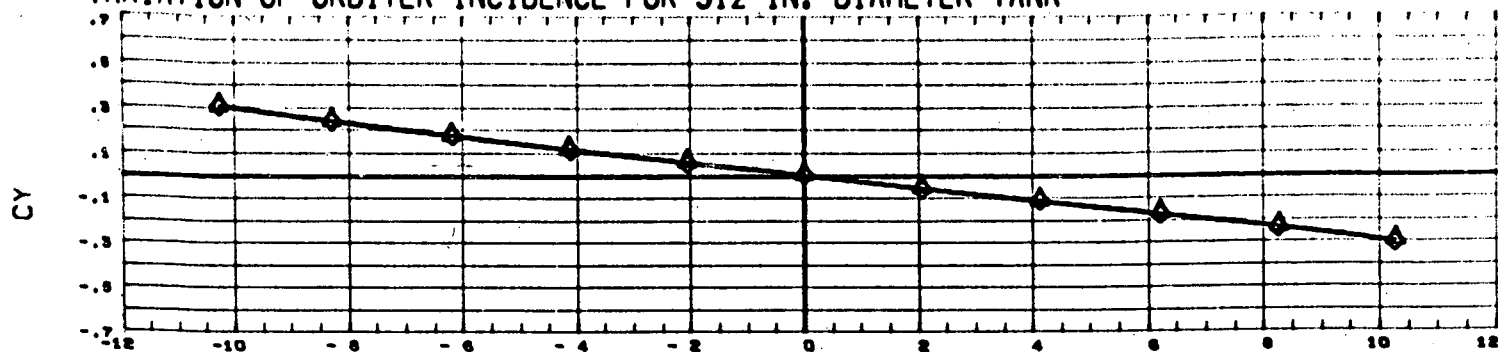
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---|--------|-------|--------|--------|-----------------------|
| (A71130) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (A71132) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF 4.4600 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| | | | | | | YMRP 0.0000 IN. |
| | | | | | | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH 1.95

VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK

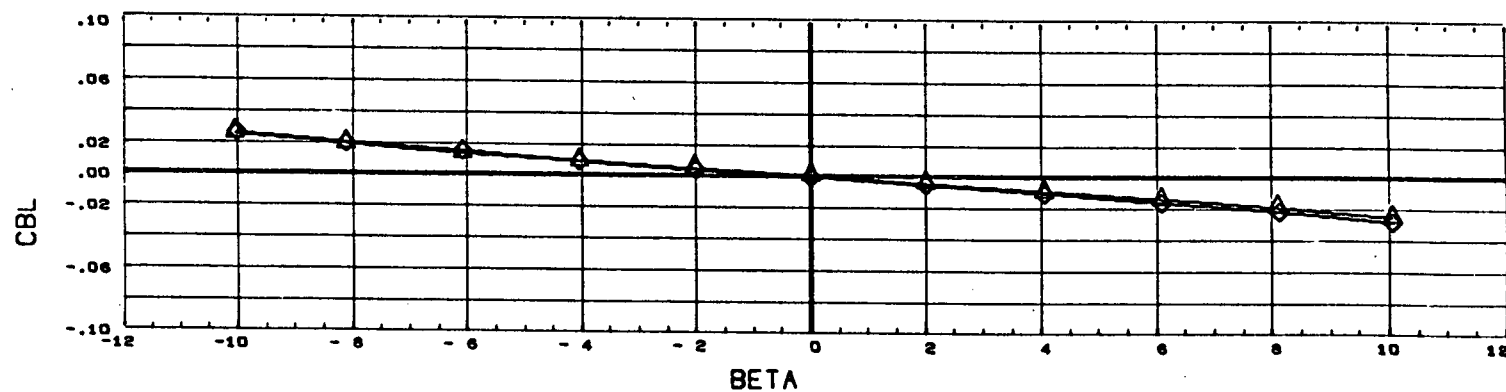
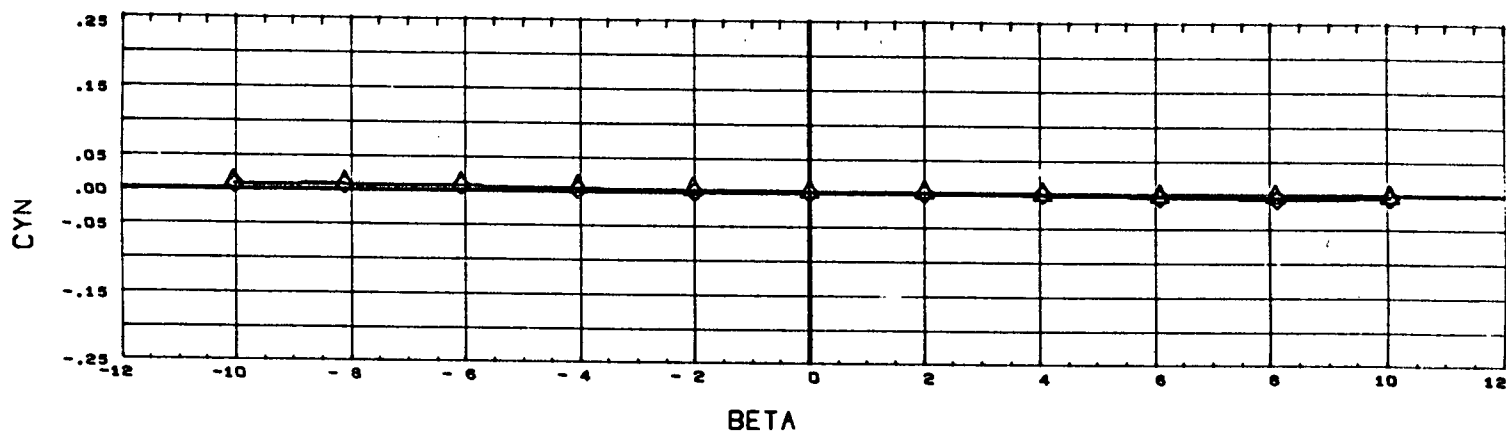
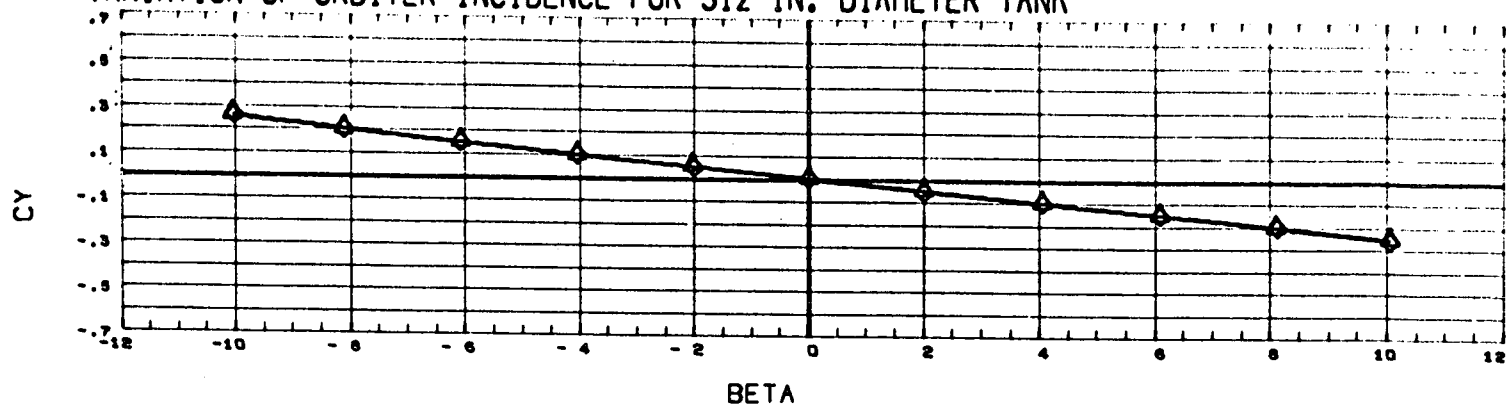


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71132) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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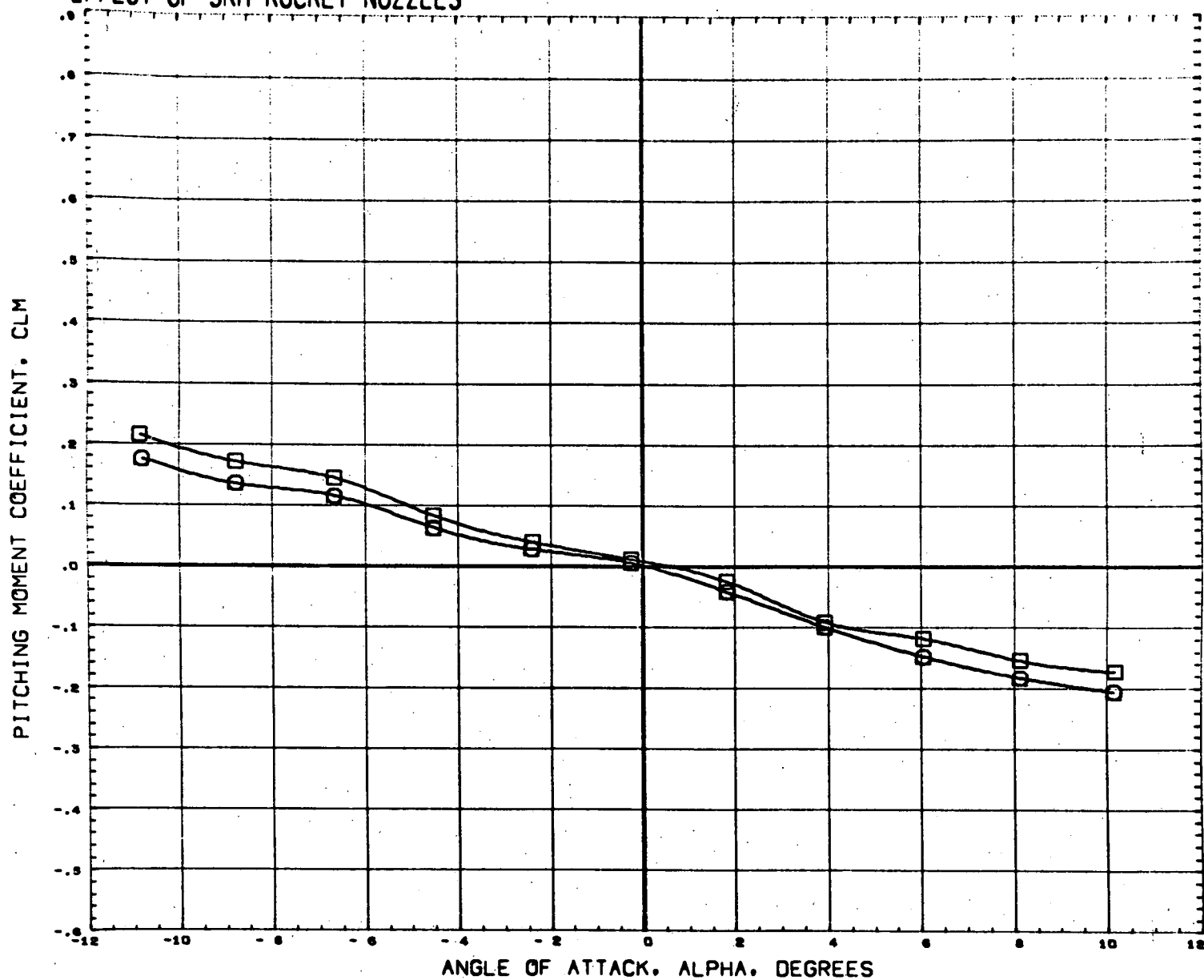
VARIATION OF ORBITER INCIDENCE FOR 312 IN. DIAMETER TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71130) | DATA NOT AVAILABLE FOR ALL CONDITIONS | -1.500 | 0.023 | 0.000 | 0.000 | SREF | 7.9800 SQ. IN. |
| (A71132) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | -1.500 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

EFFECT OF SRM ROCKET NOZZLES

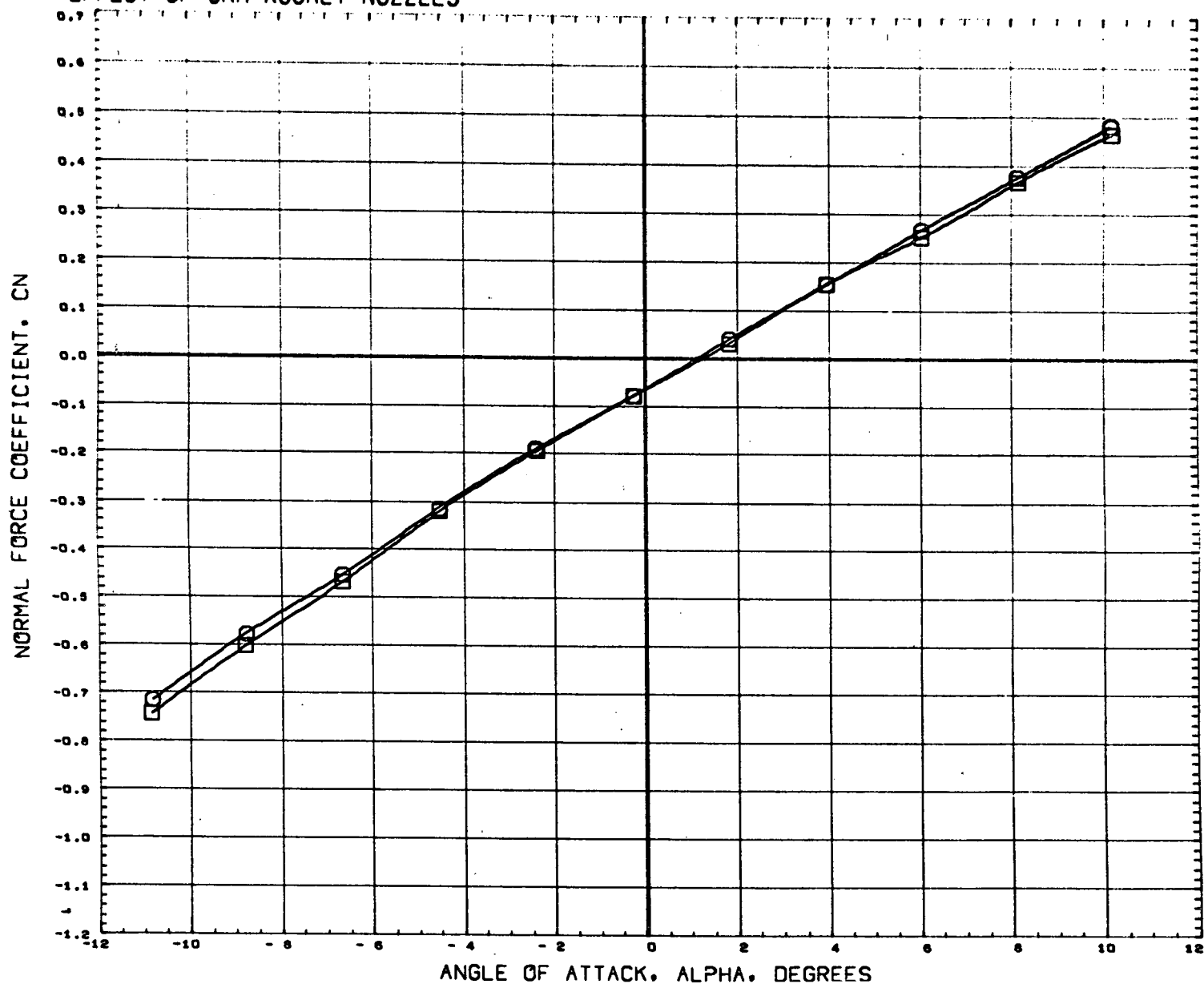


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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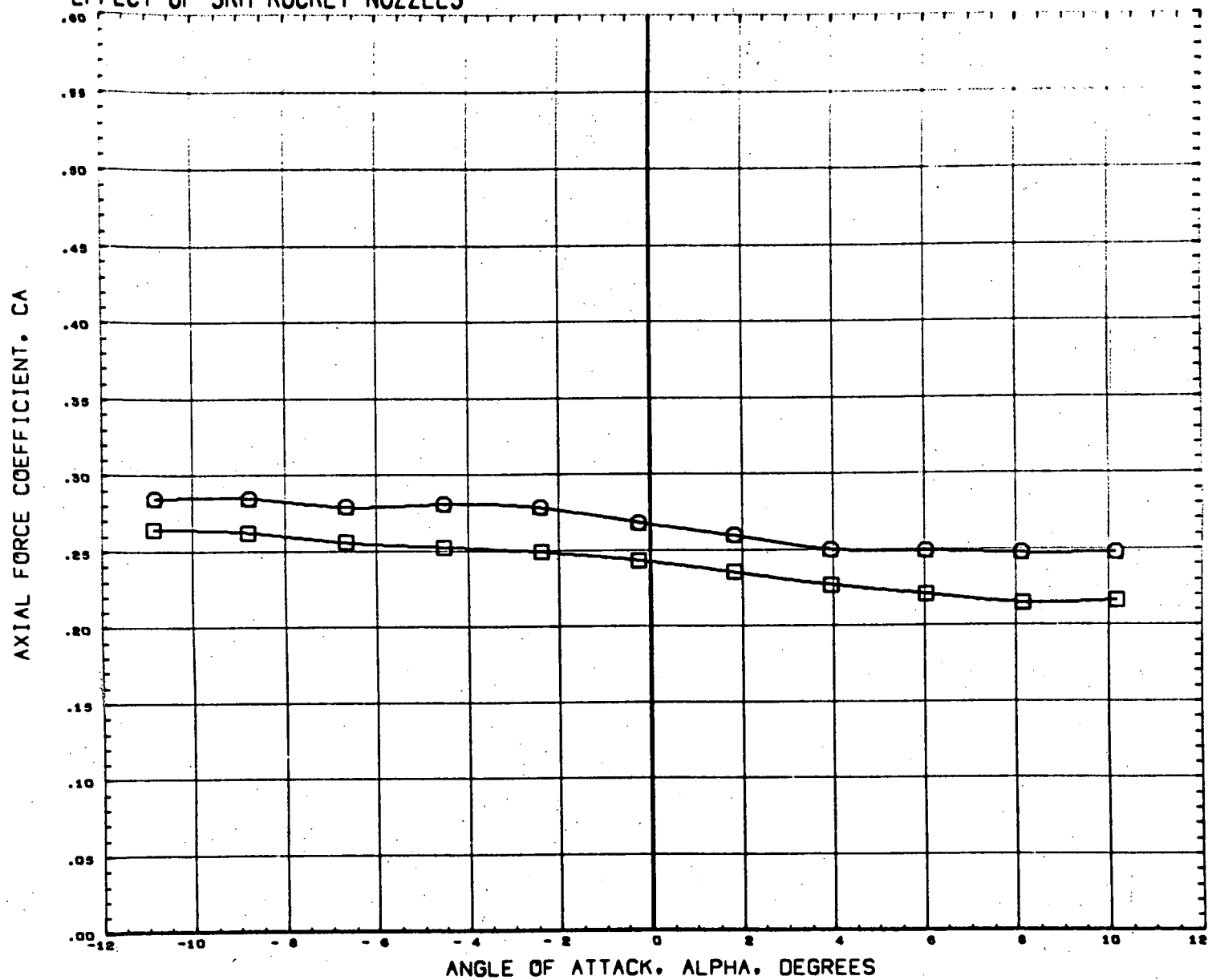
EFFECT OF SRM ROCKET NOZZLES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

EFFECT OF SRM ROCKET NOZZLES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORIGIN | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2400 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

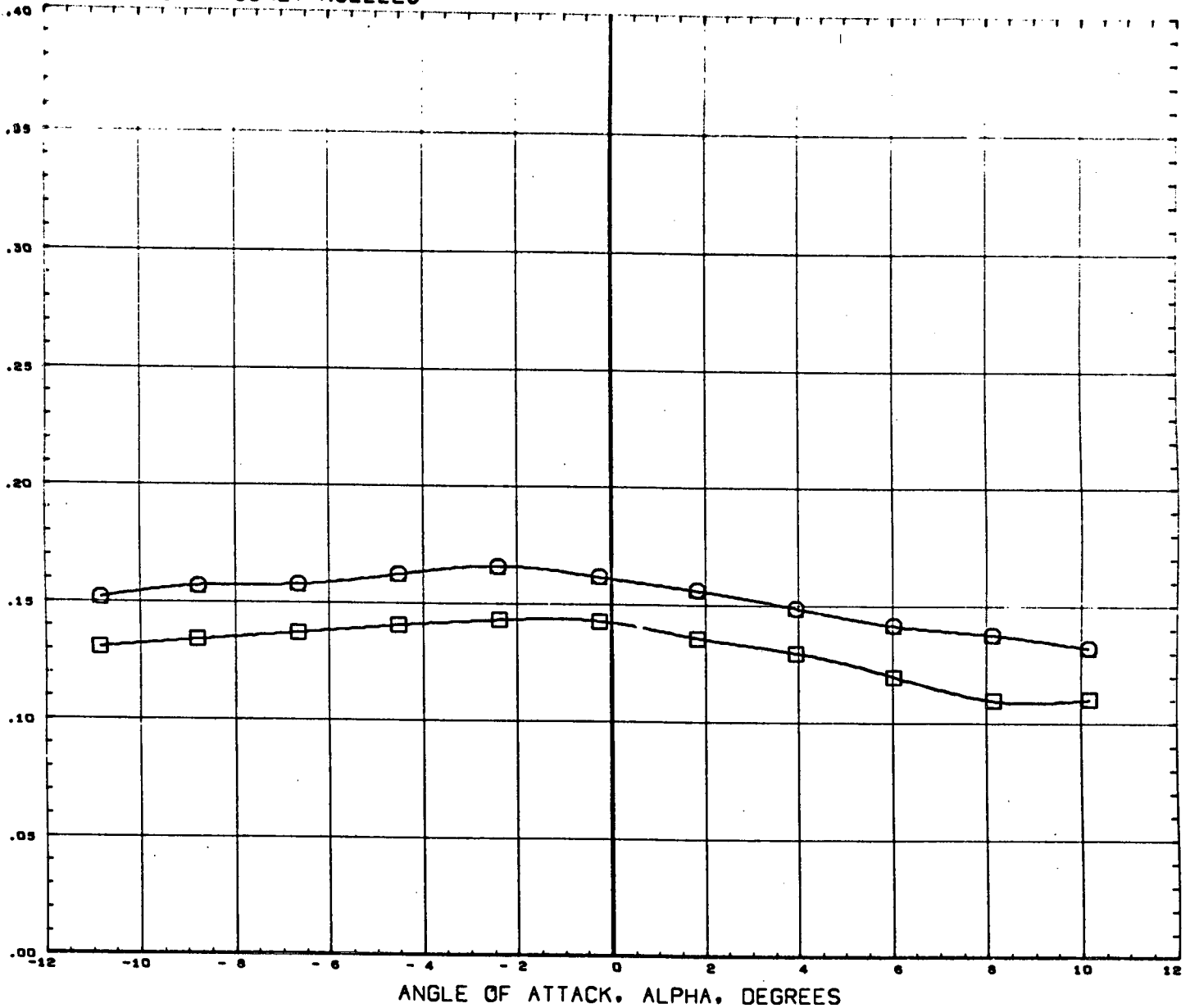
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EFFECT OF SRM ROCKET NOZZLES

FOREBODY AXIAL FORCE COEFFICIENT, CAF



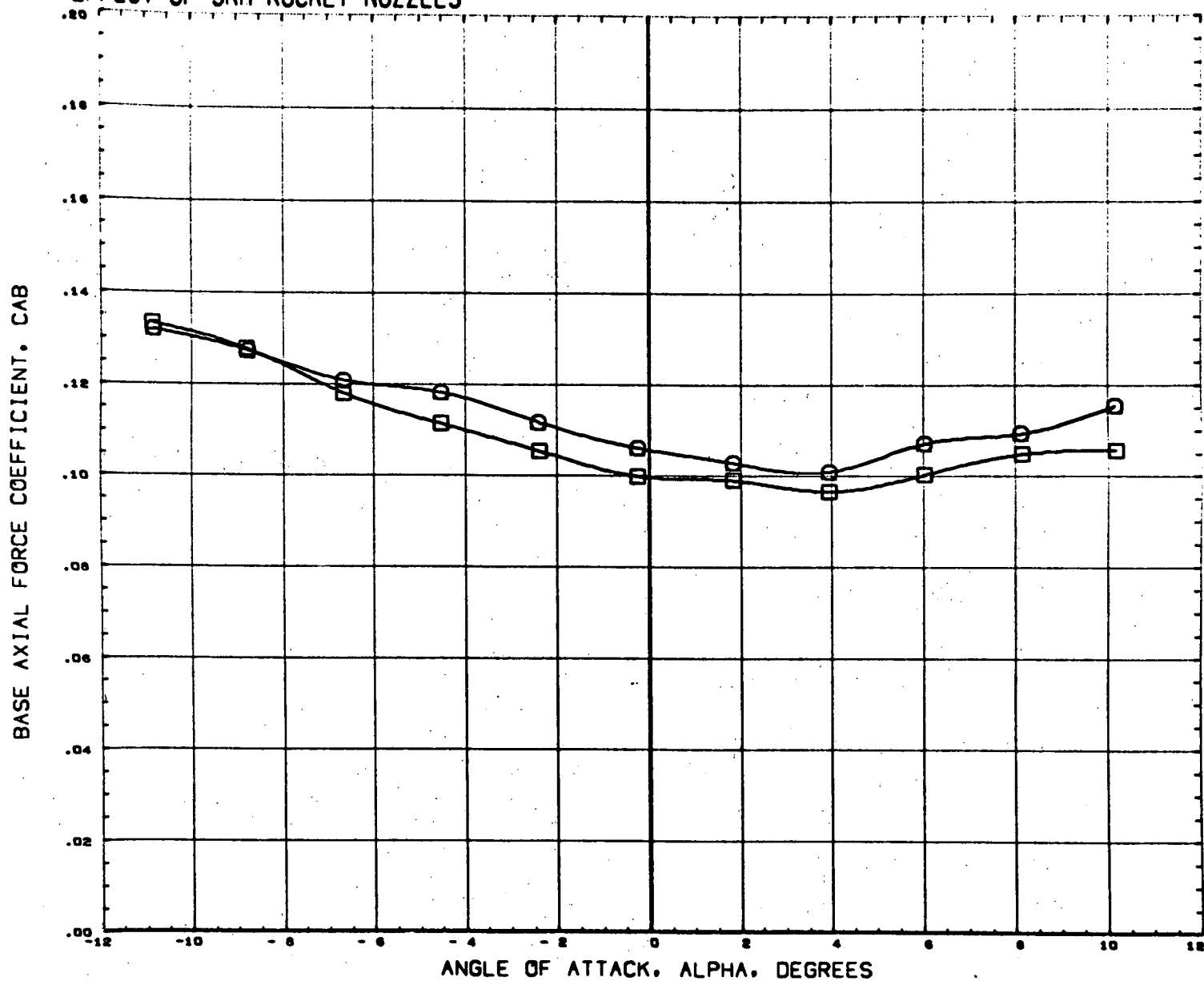
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|--------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 50 IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0290 | IN. |
| (871117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (871119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

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EFFECT OF SRM ROCKET NOZZLES

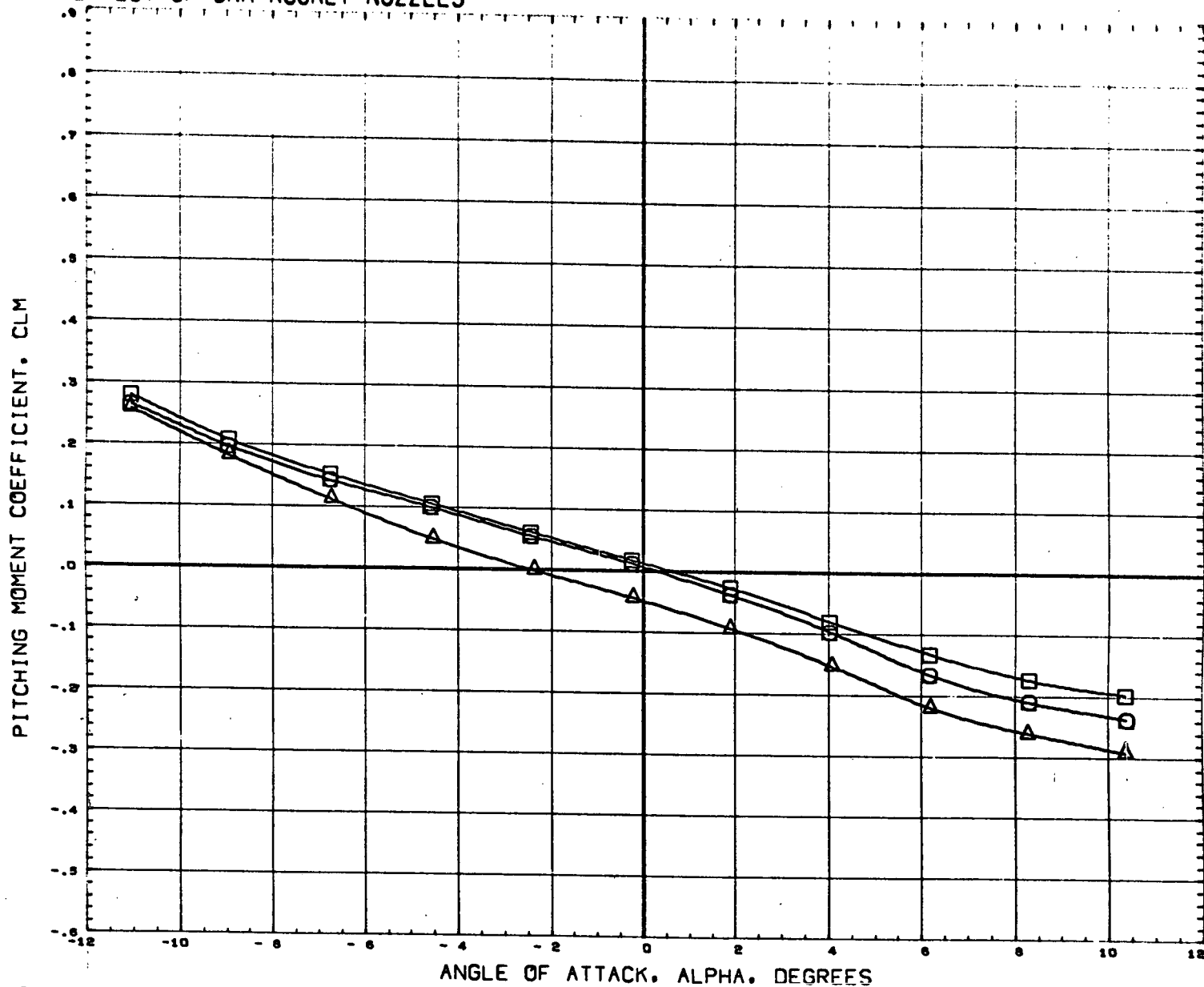


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 30. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2400 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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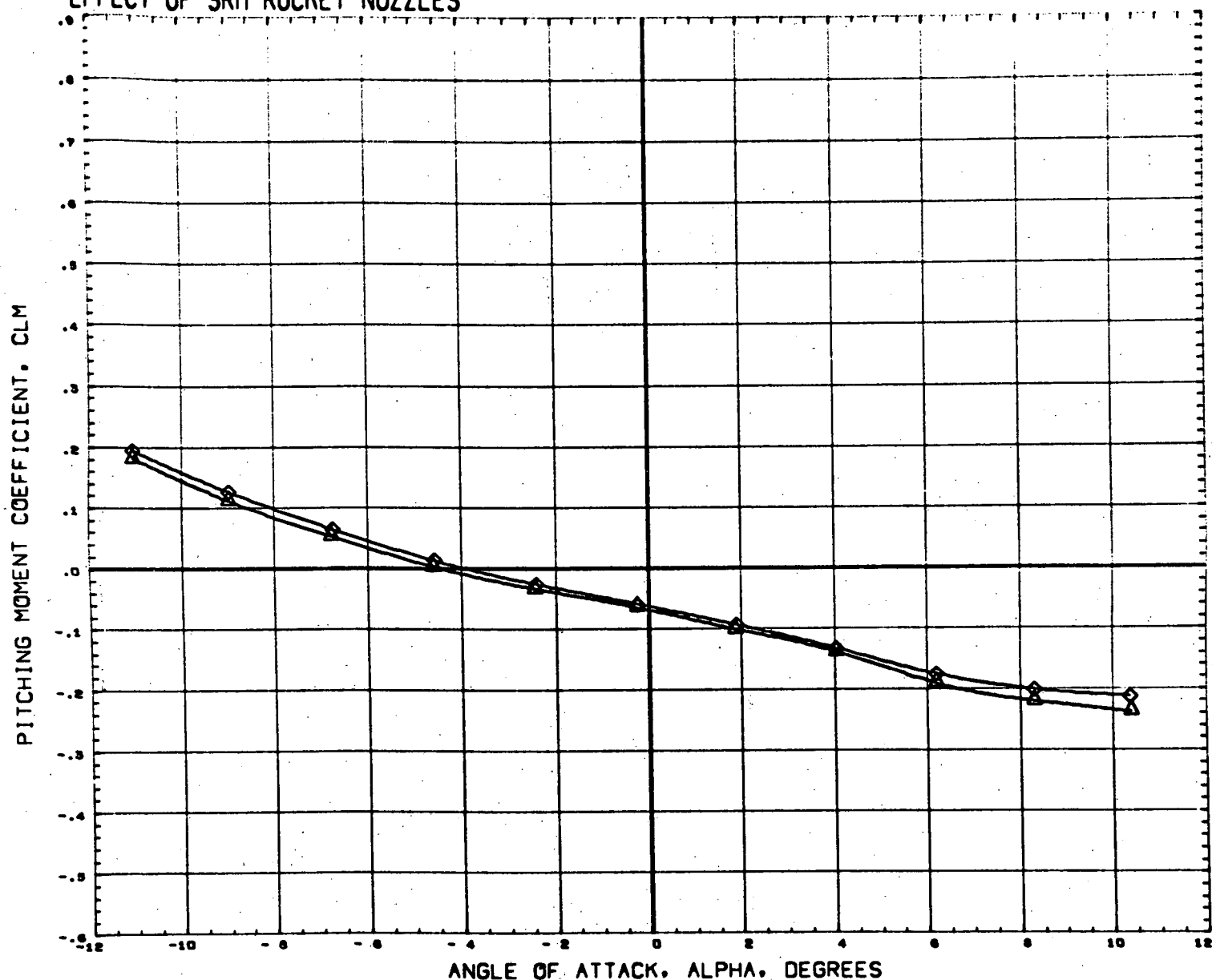
EFFECT OF SRM ROCKET NOZZLES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

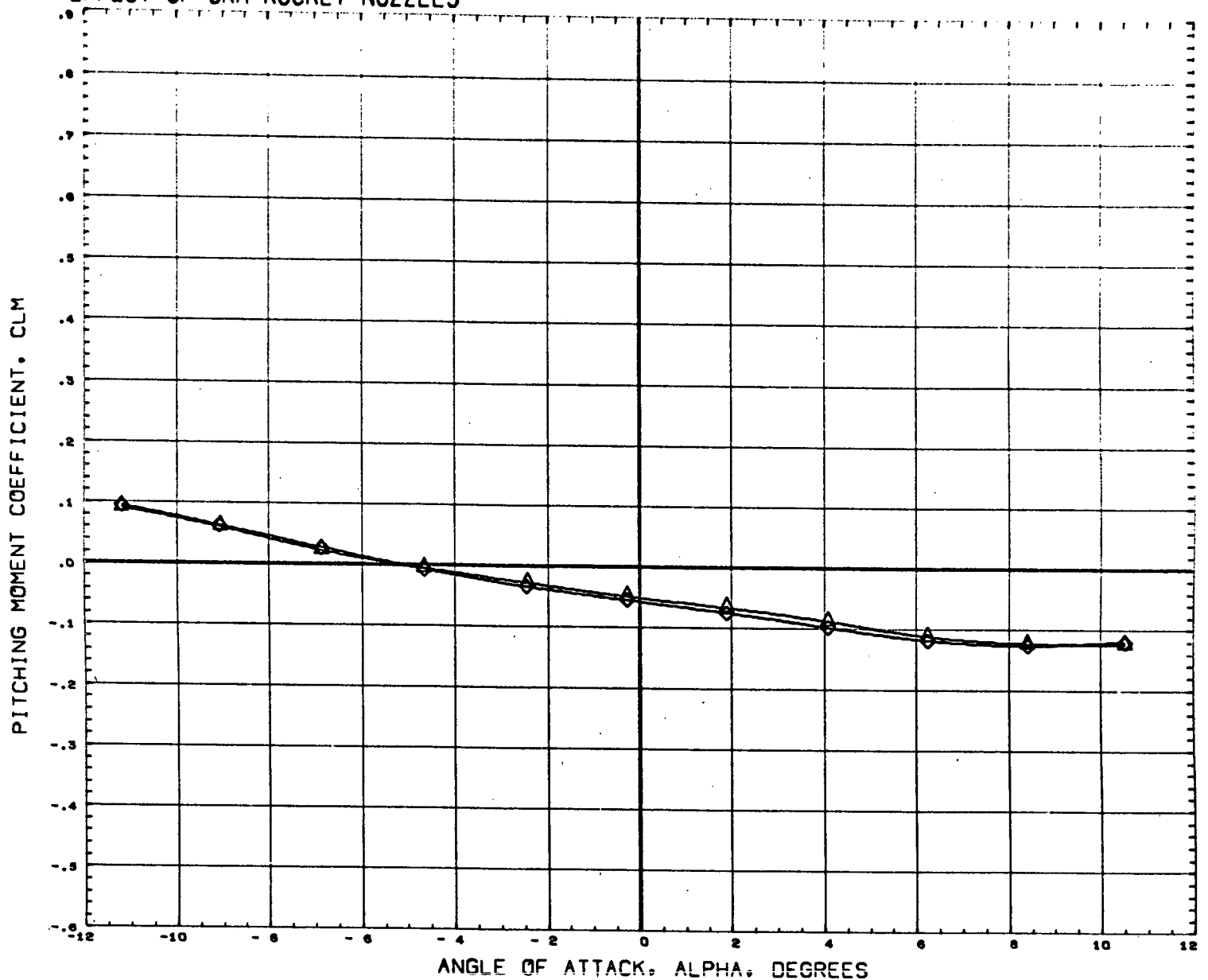


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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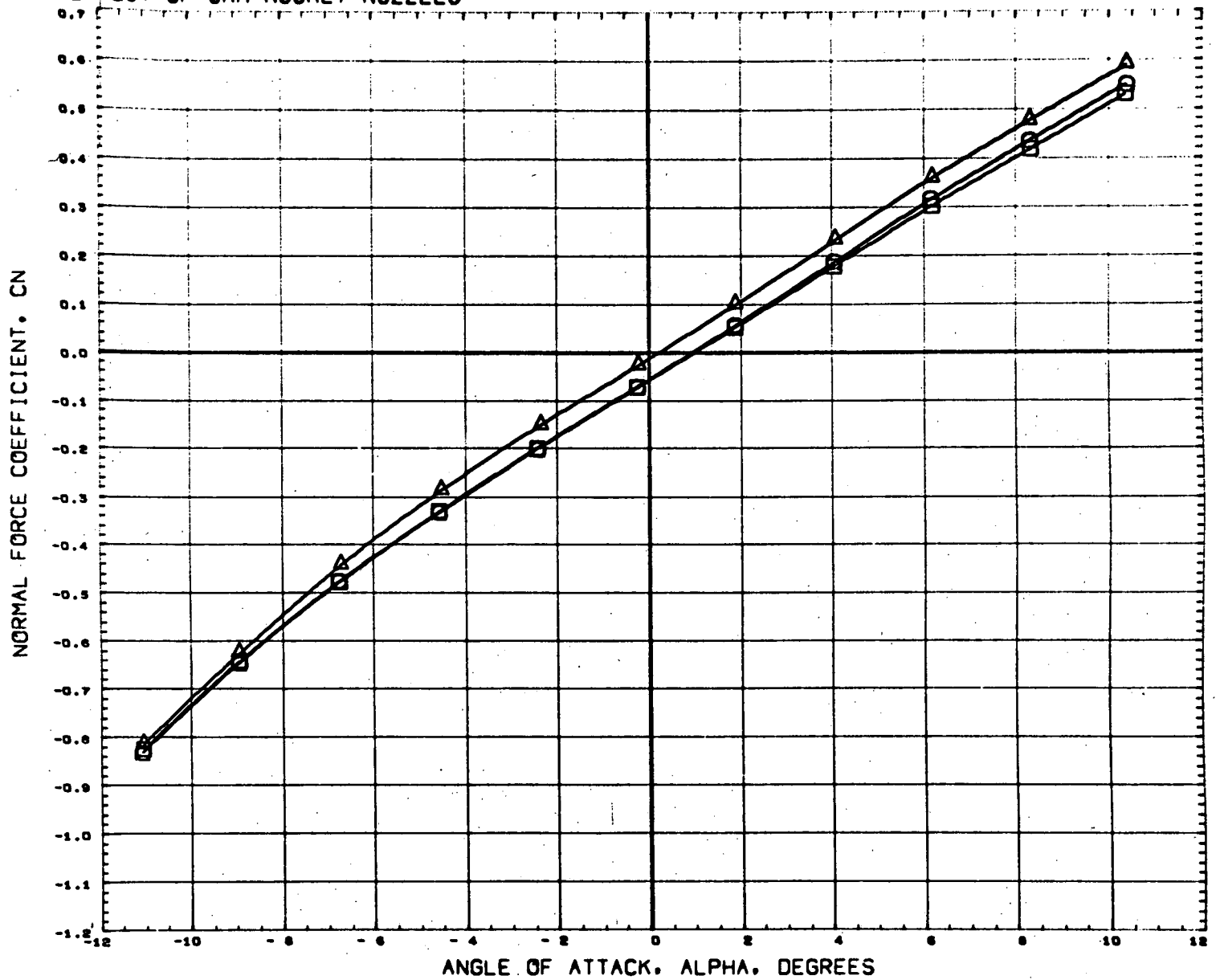
EFFECT OF SRM ROCKET NOZZLES



| DATA SET | SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|----------|--------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | ○ | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | △ | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71117) | ◇ | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30236 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | □ | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | | YMRP | 0.0000 IN. |
| | | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

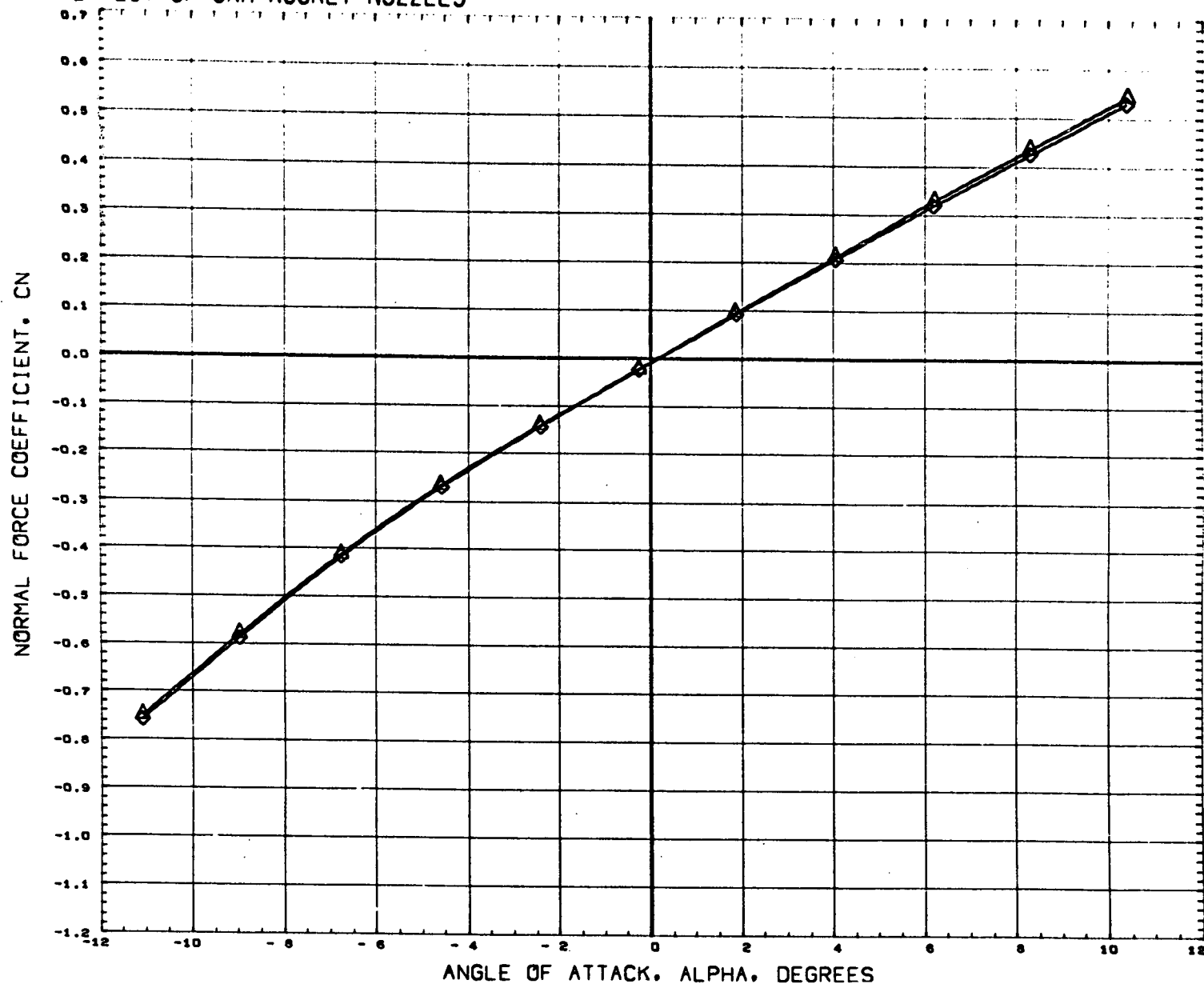


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ.IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

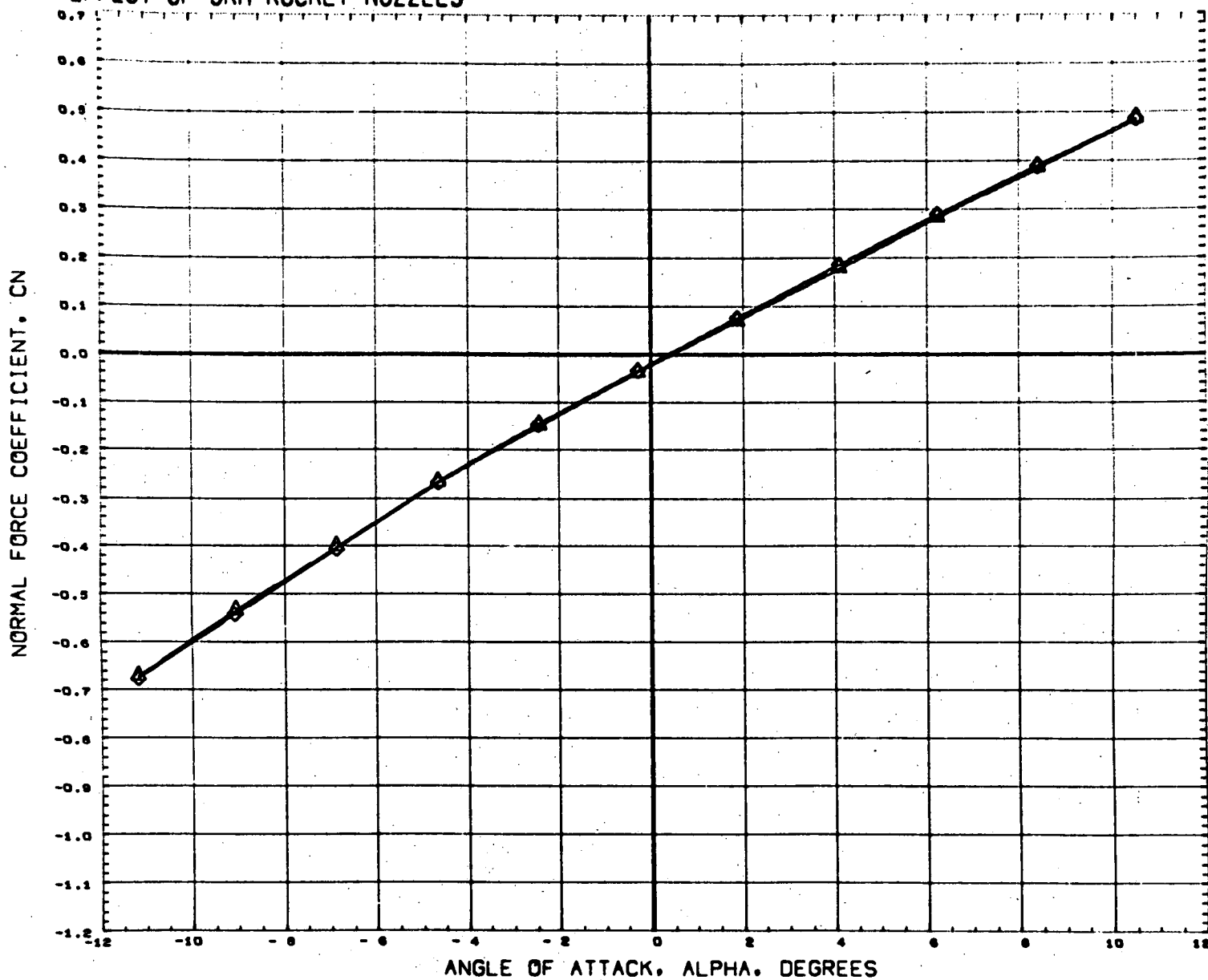


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

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EFFECT OF SRM ROCKET NOZZLES



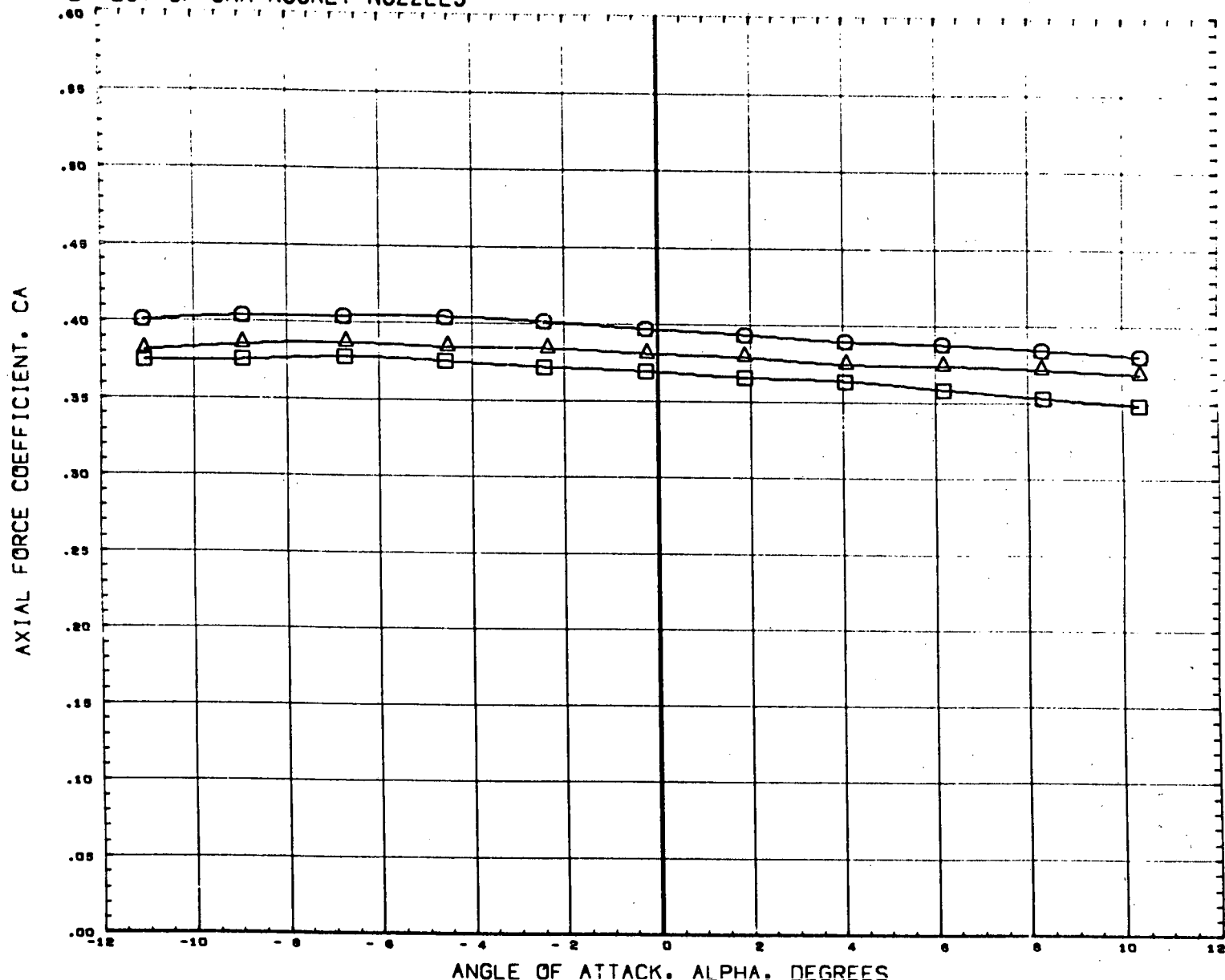
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30236 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES



ANGLE OF ATTACK, ALPHA, DEGREES

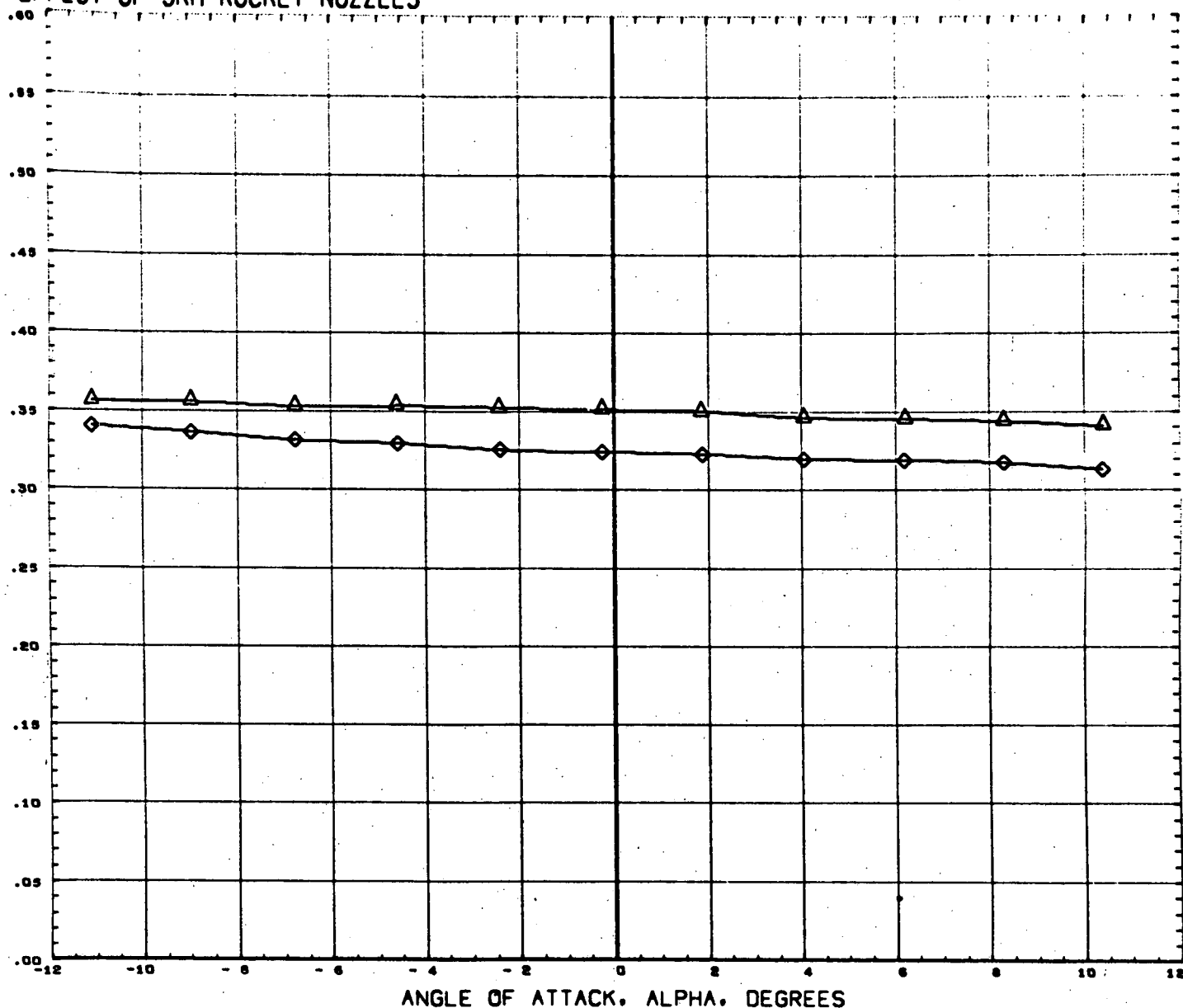
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
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| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0290 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

AXIAL FORCE COEFFICIENT, CA



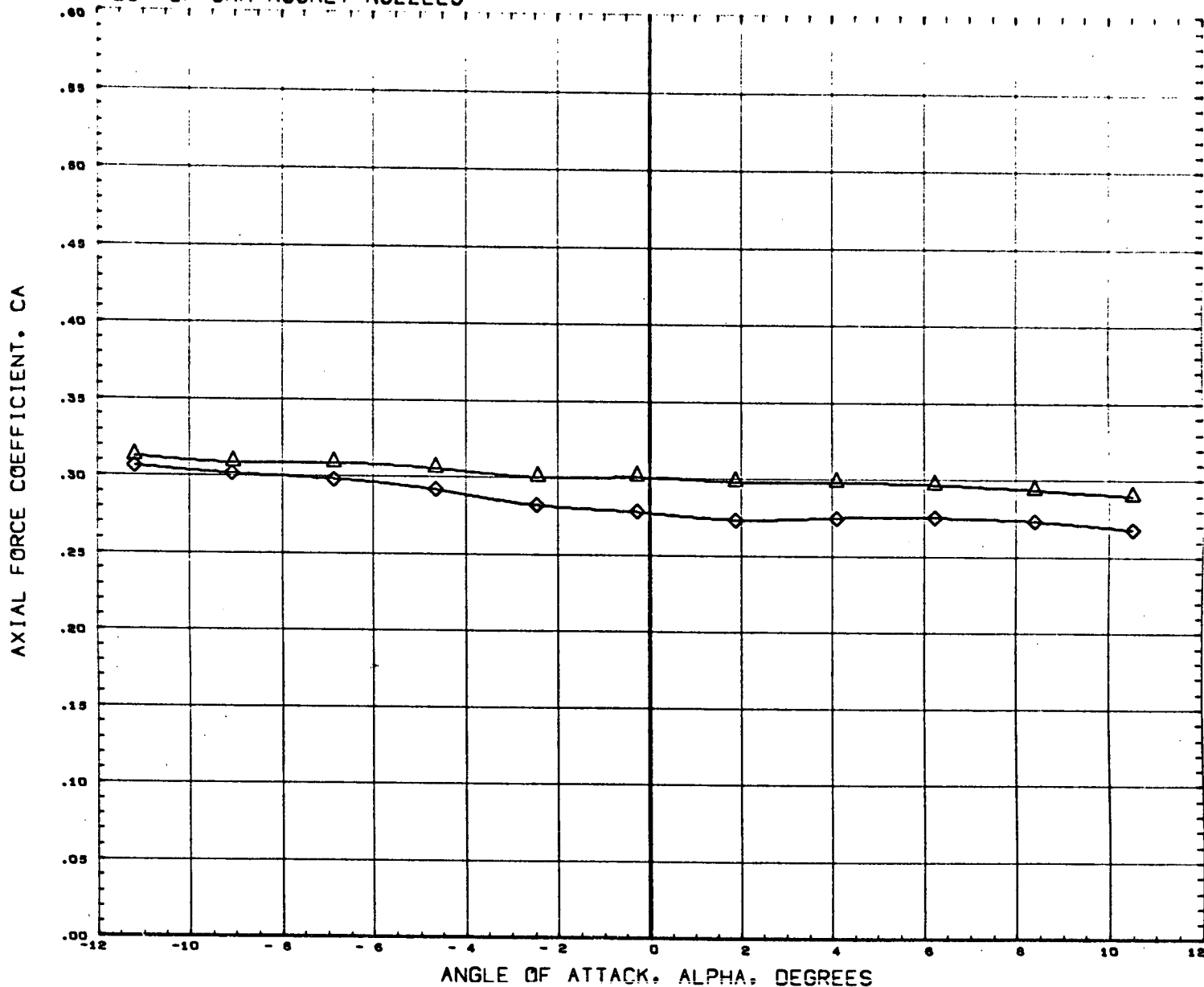
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ.IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30256 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

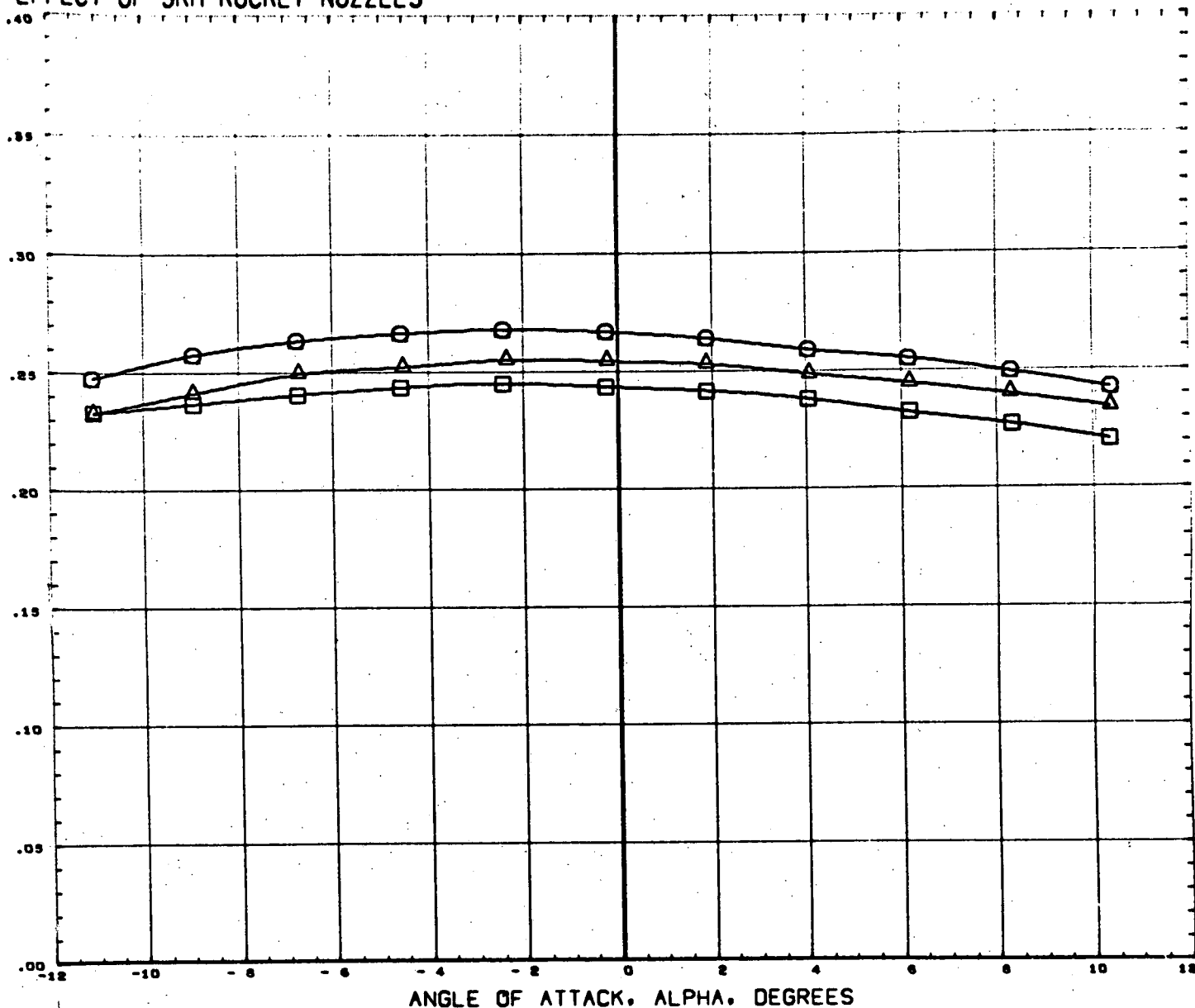


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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

FOREBODY AXIAL FORCE COEFFICIENT, CAF



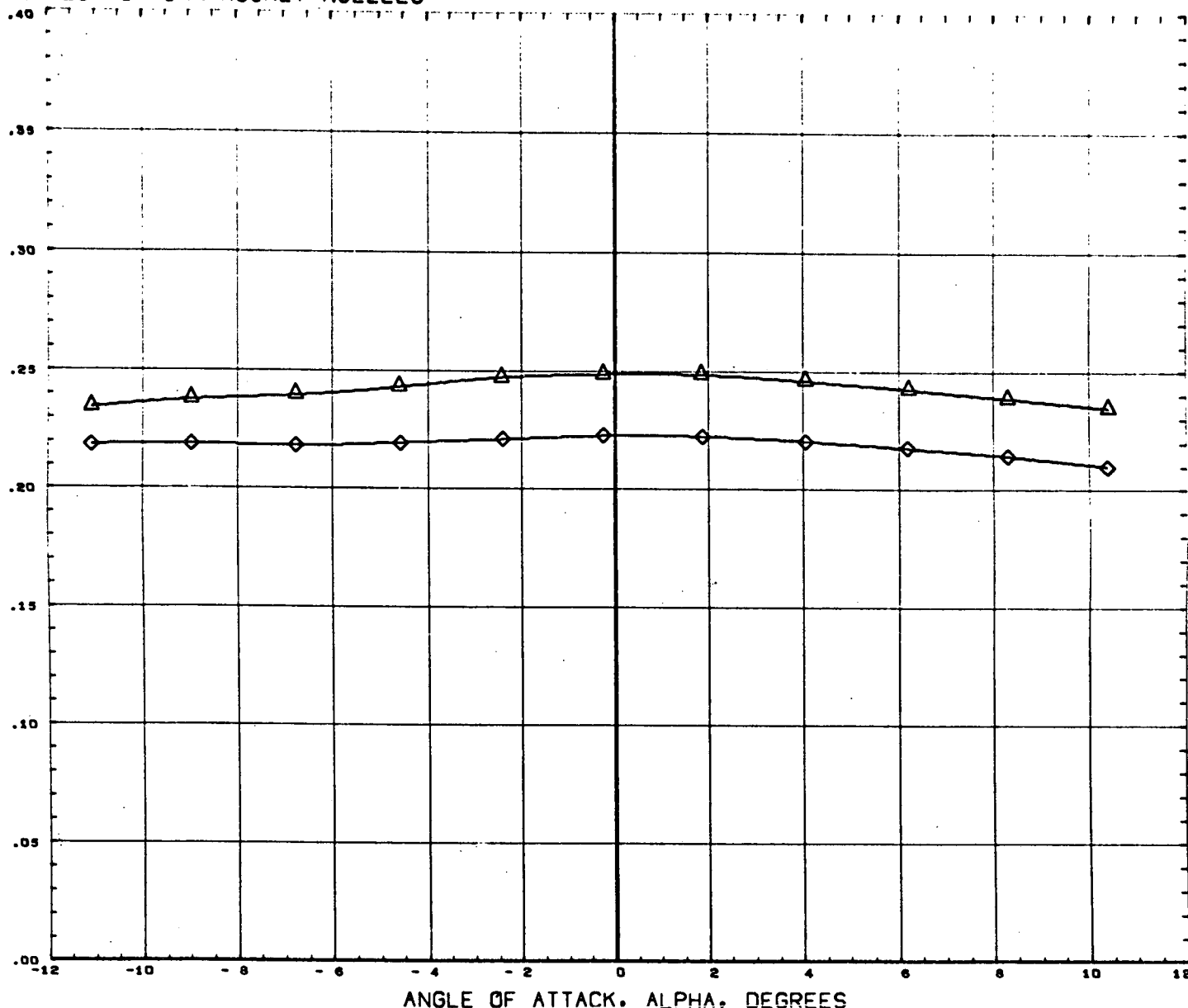
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 30.IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 1N. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 1N. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 1N. |
| | | | | | | YHRP | 0.0000 1N. |
| | | | | | | ZHRP | 0.2480 1N. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

FOREBODY AXIAL FORCE COEFFICIENT, CAF



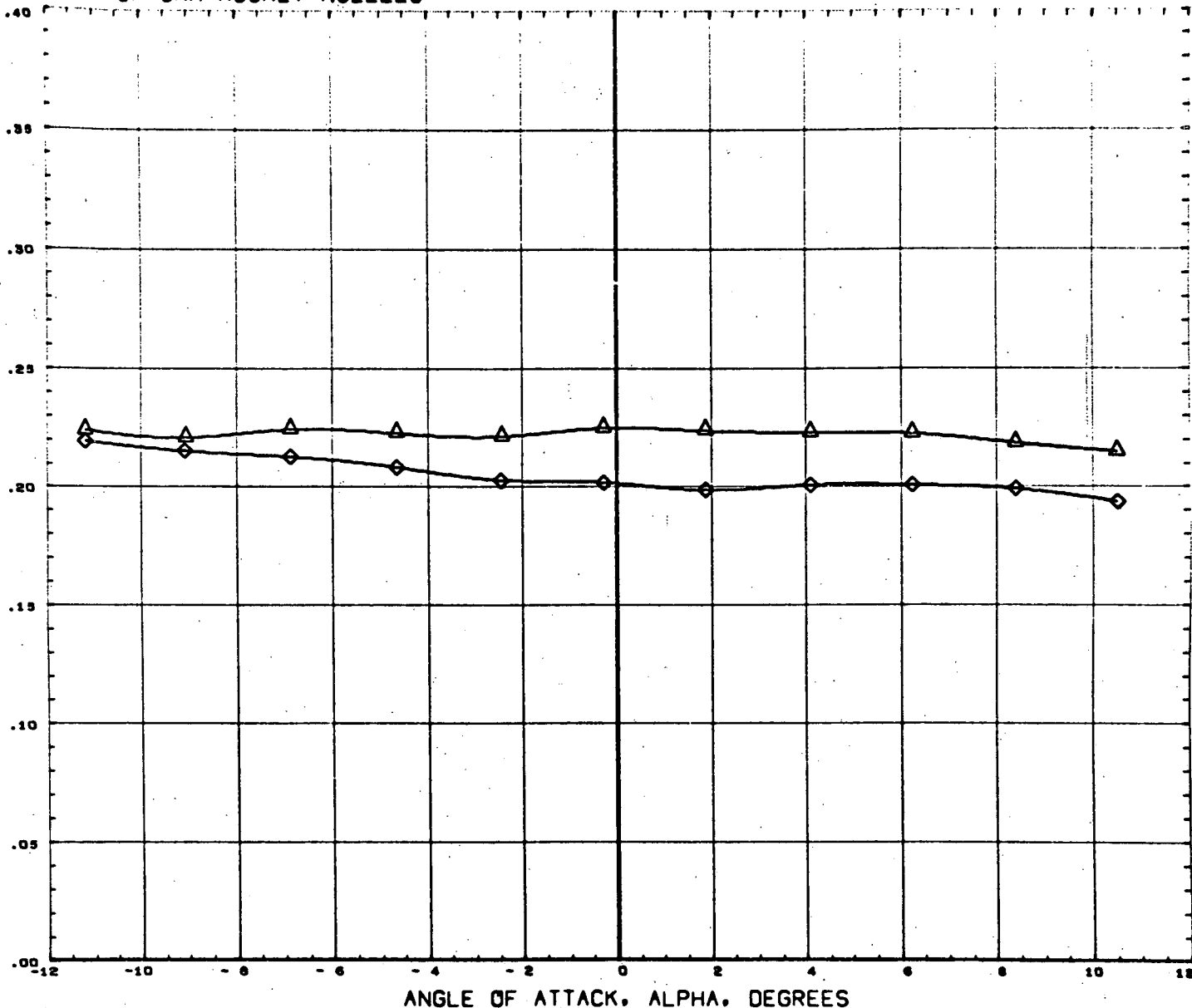
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

FOREBODY AXIAL FORCE COEFFICIENT, CAF

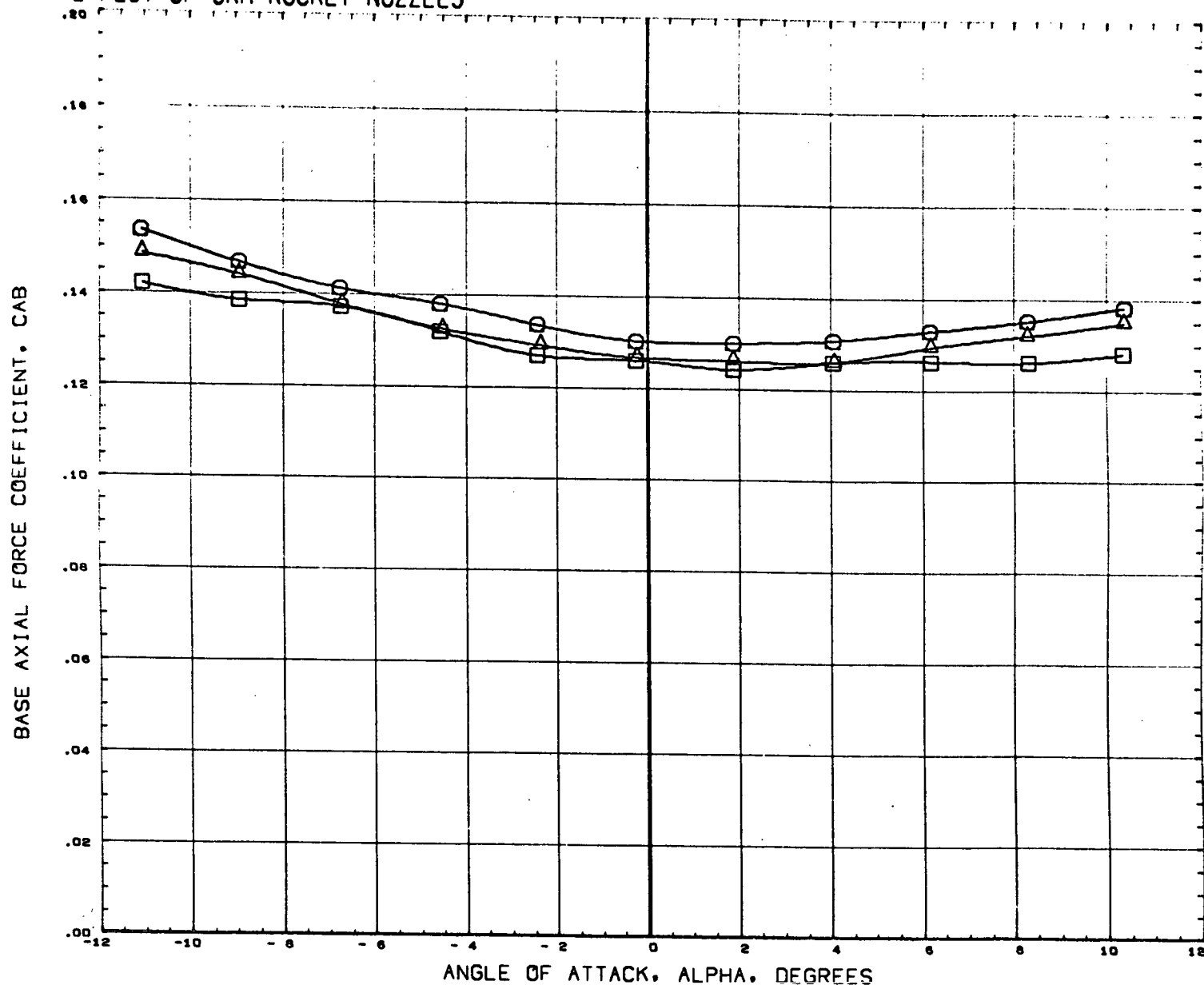


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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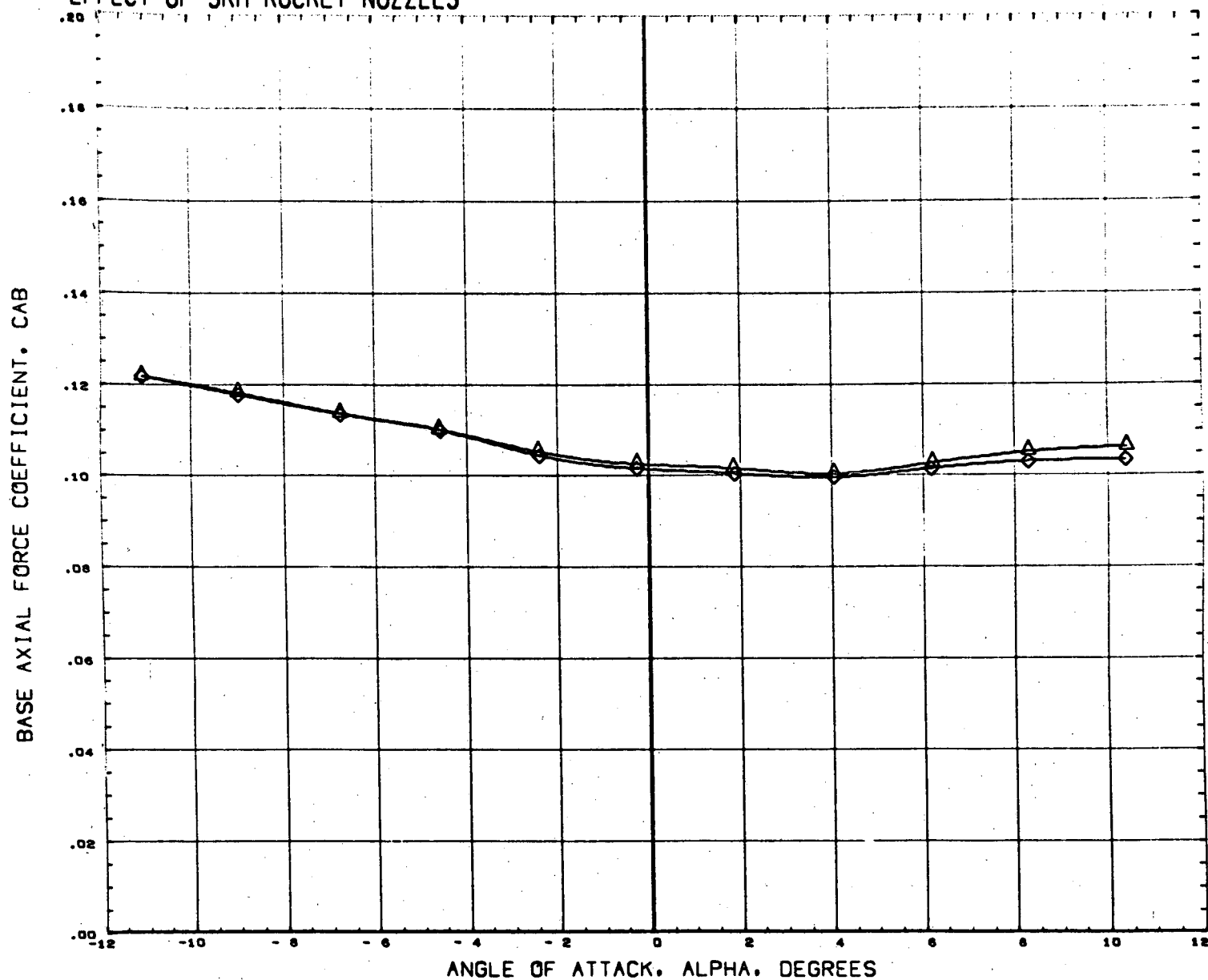
EFFECT OF SRM ROCKET NOZZLES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0290 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES



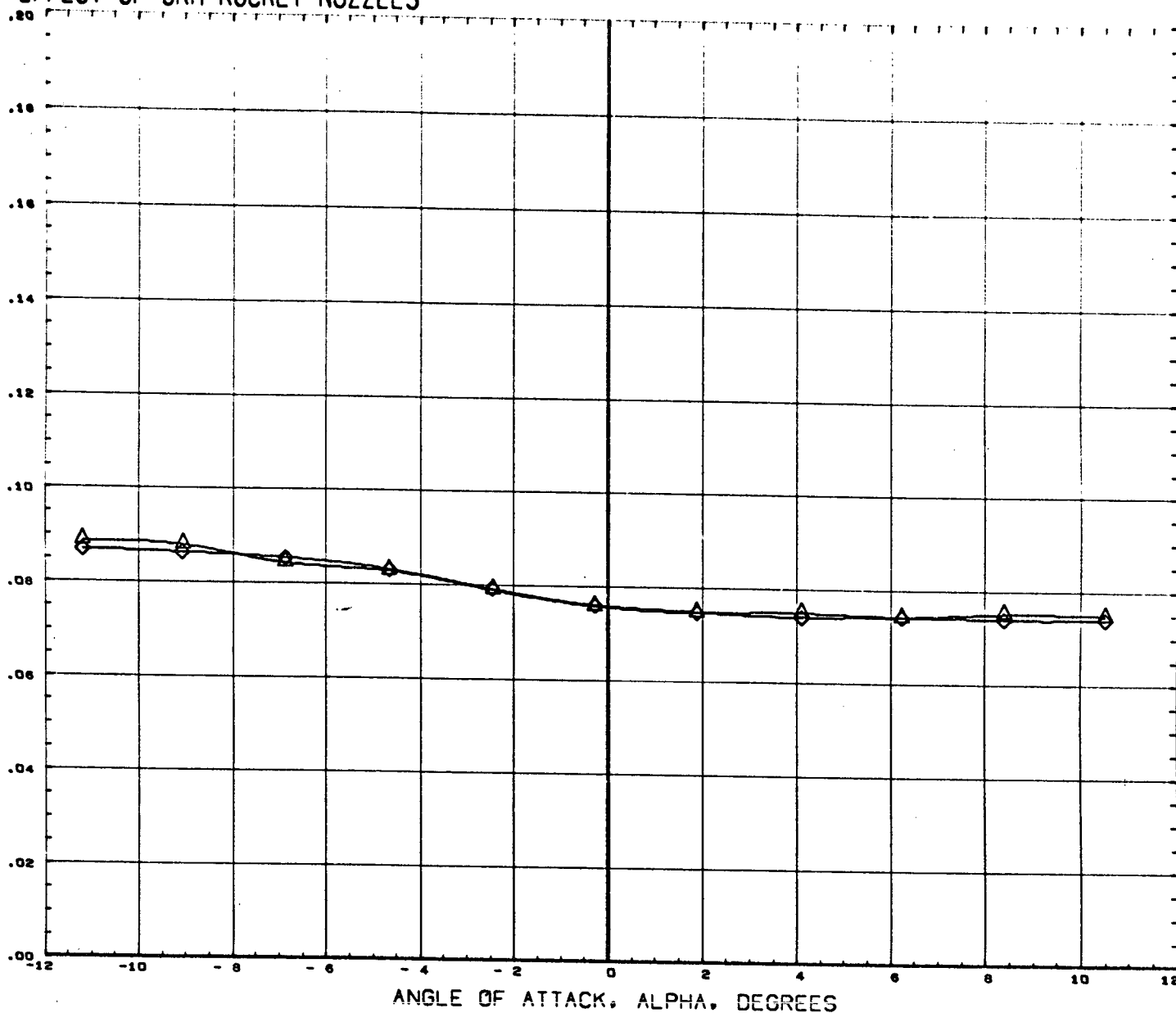
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|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30256 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

BASE AXIAL FORCE COEFFICIENT, CAB

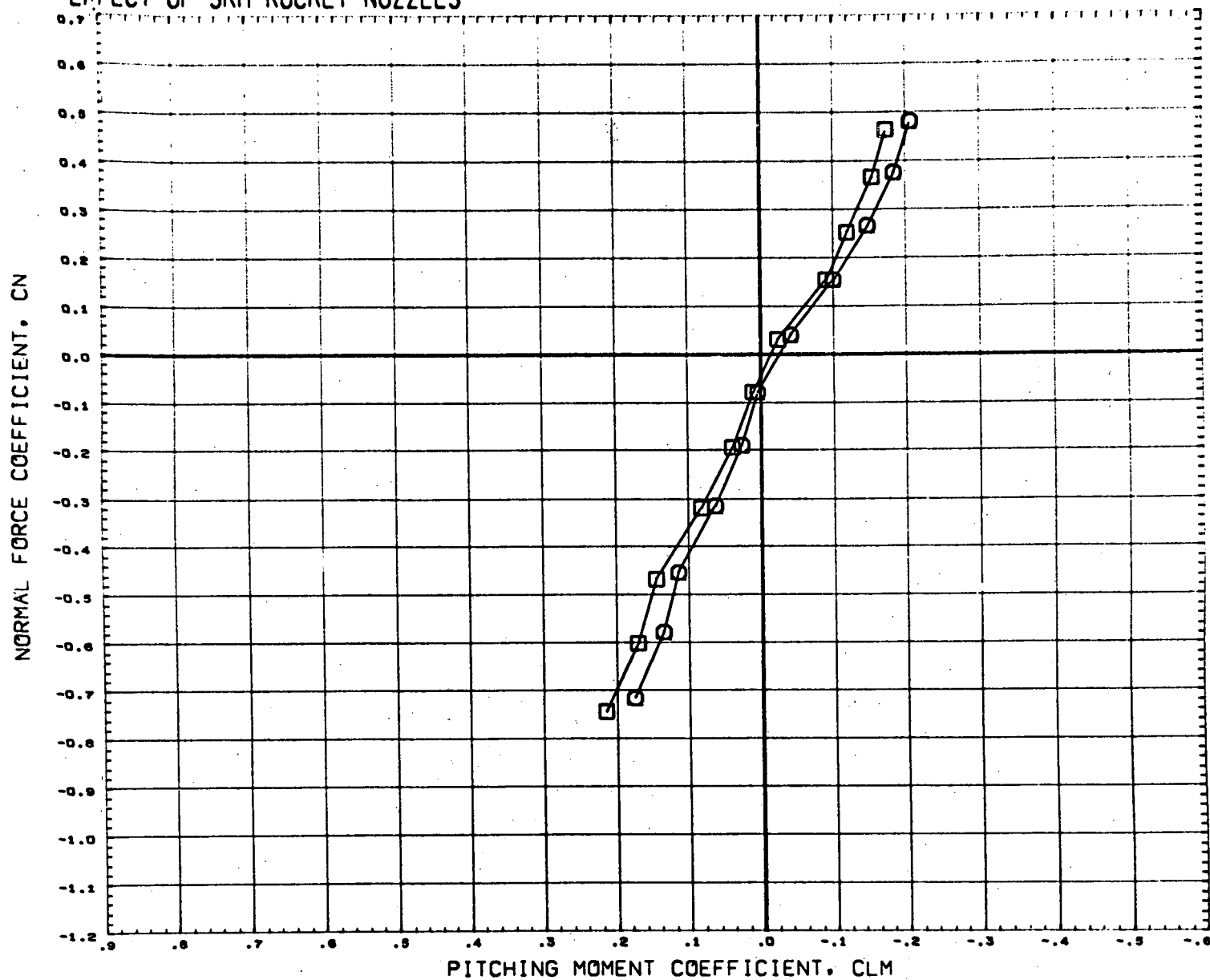


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF SRM ROCKET NOZZLES

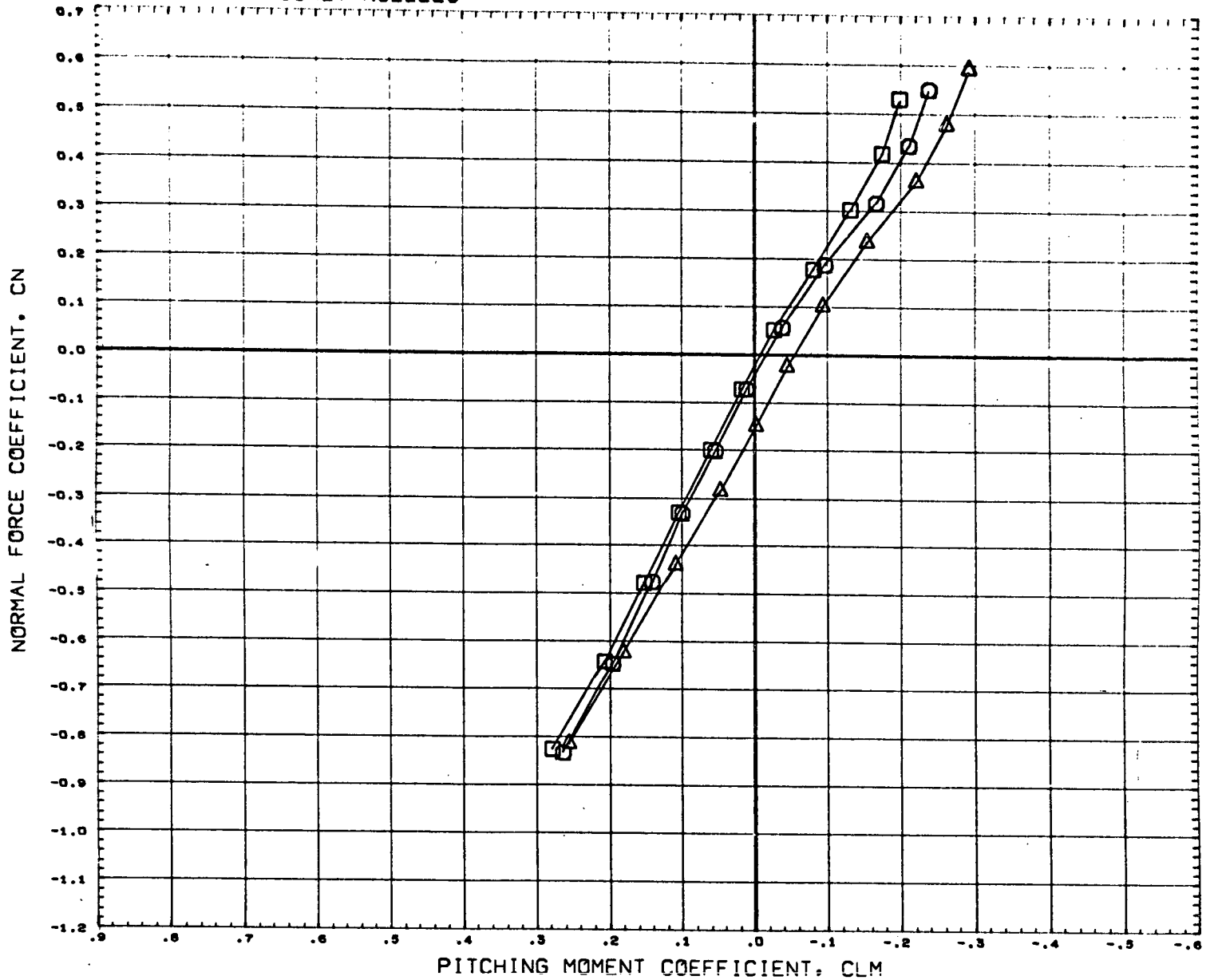


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF SRM ROCKET NOZZLES

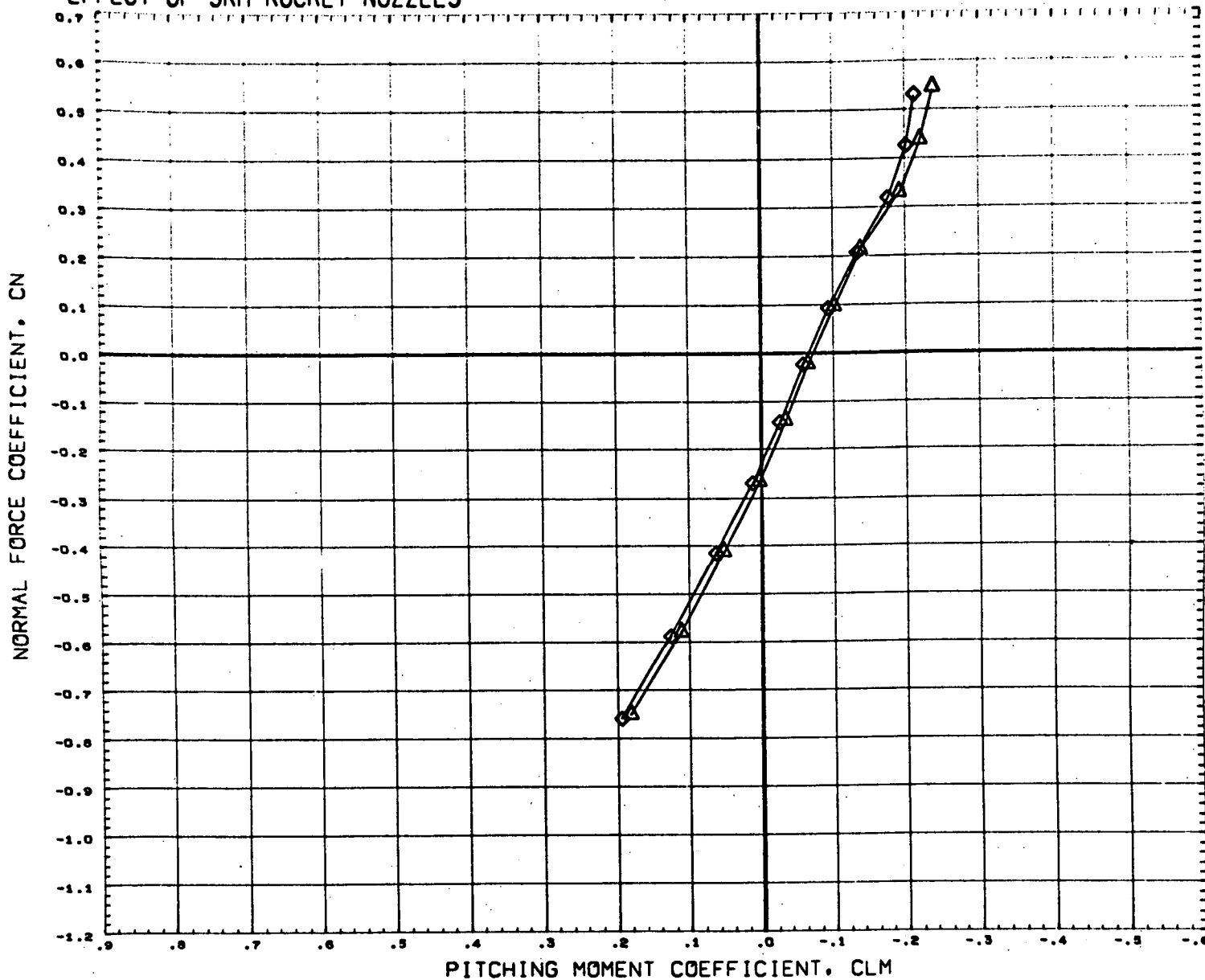


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT INC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-----------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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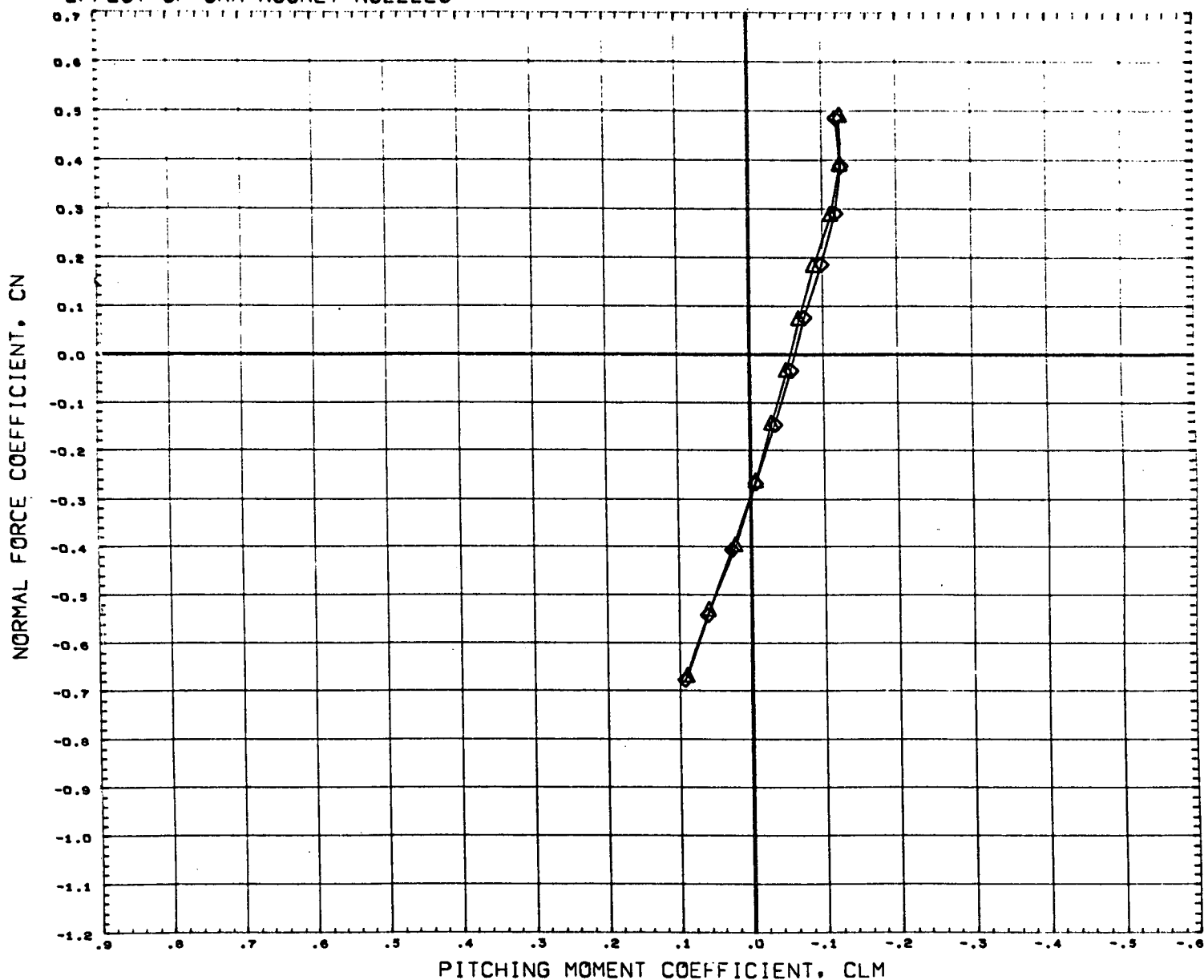
EFFECT OF SRM ROCKET NOZZLES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|--------|
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 50 IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.46

EFFECT OF SRM ROCKET NOZZLES

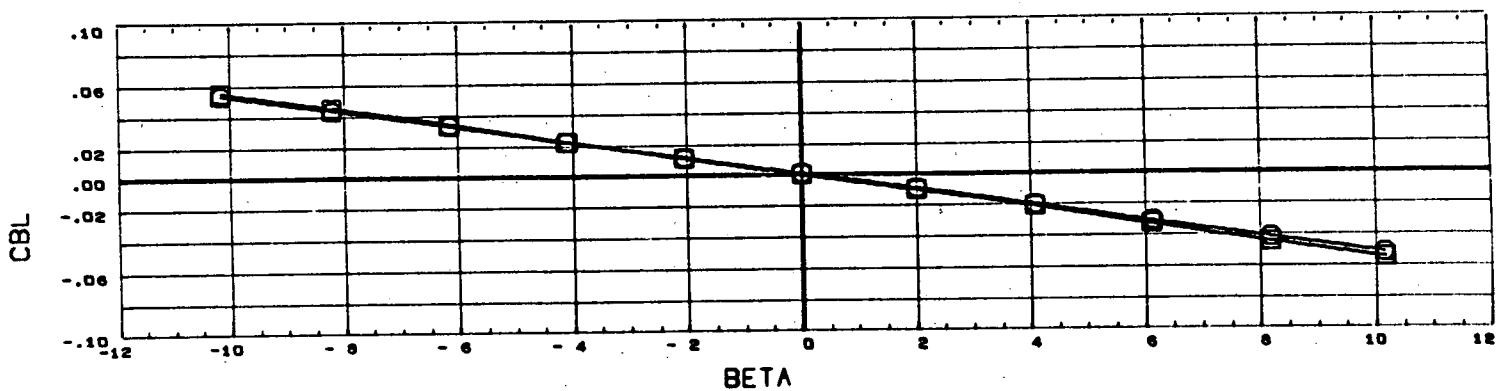
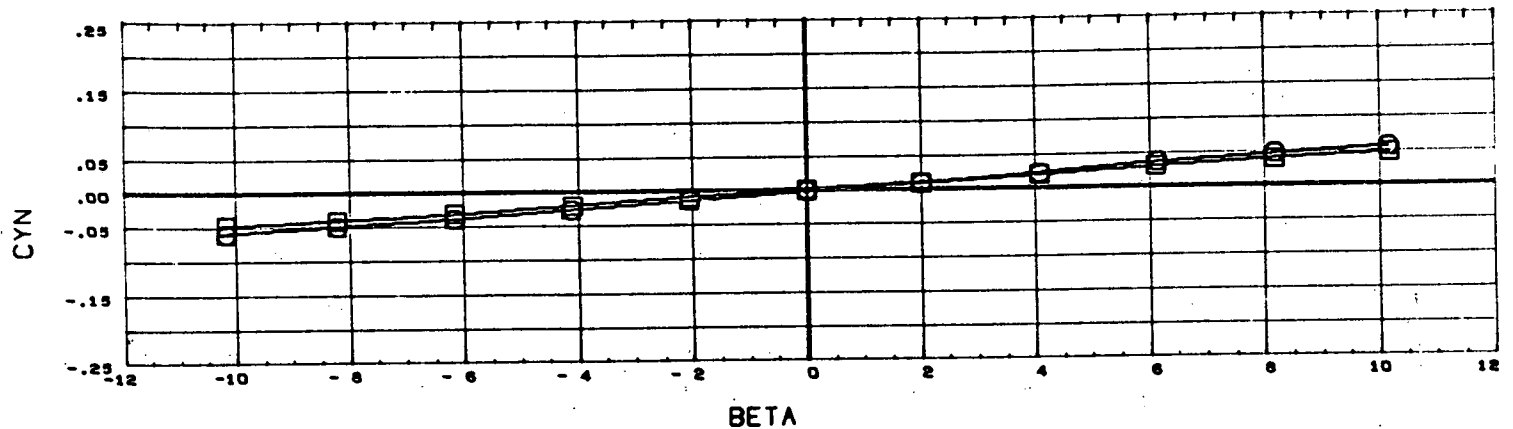
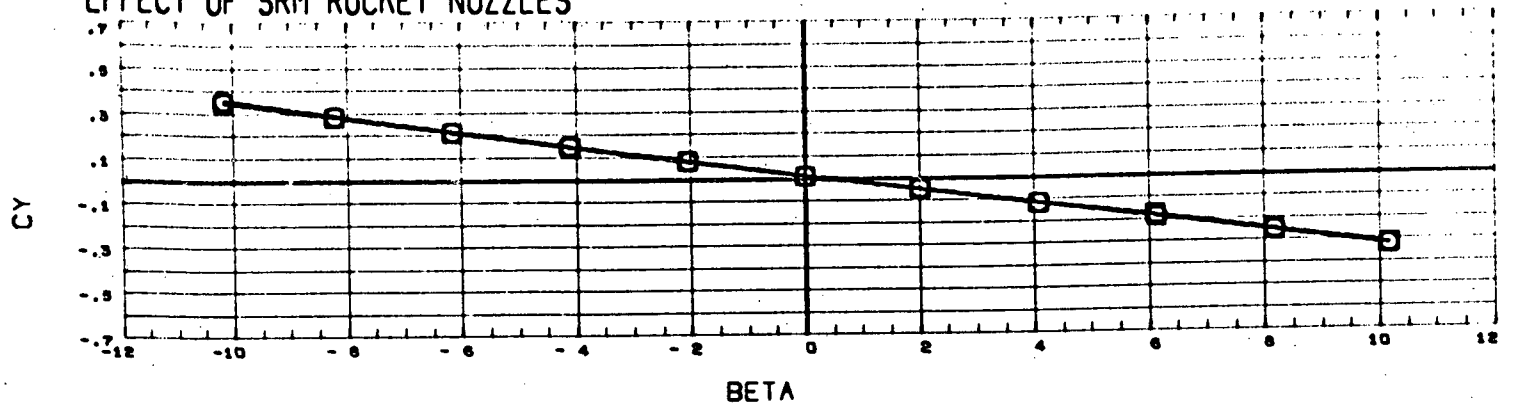


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71117) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S6 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (B71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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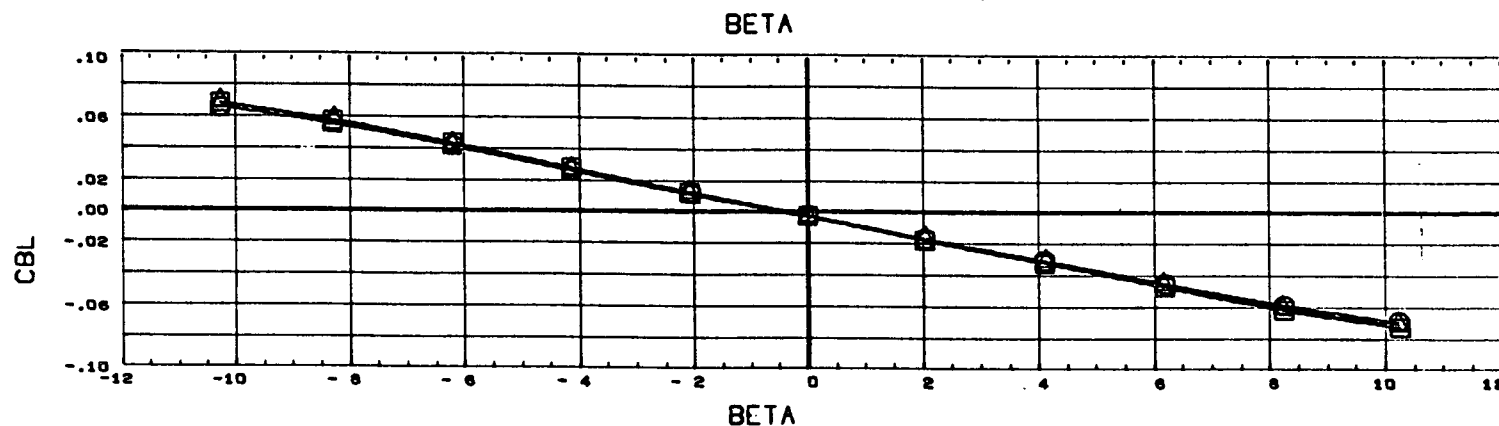
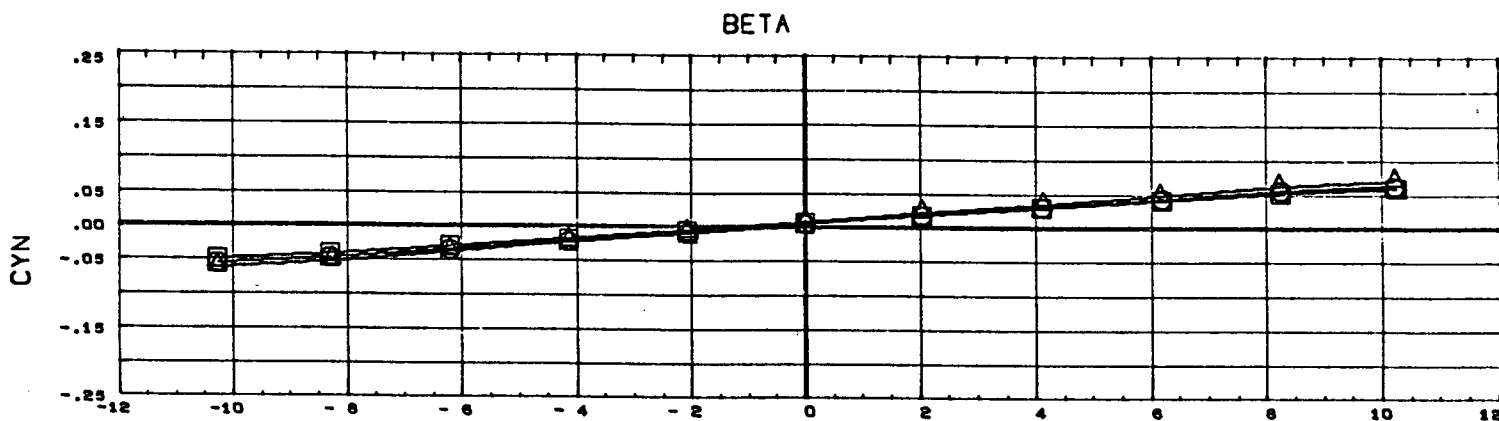
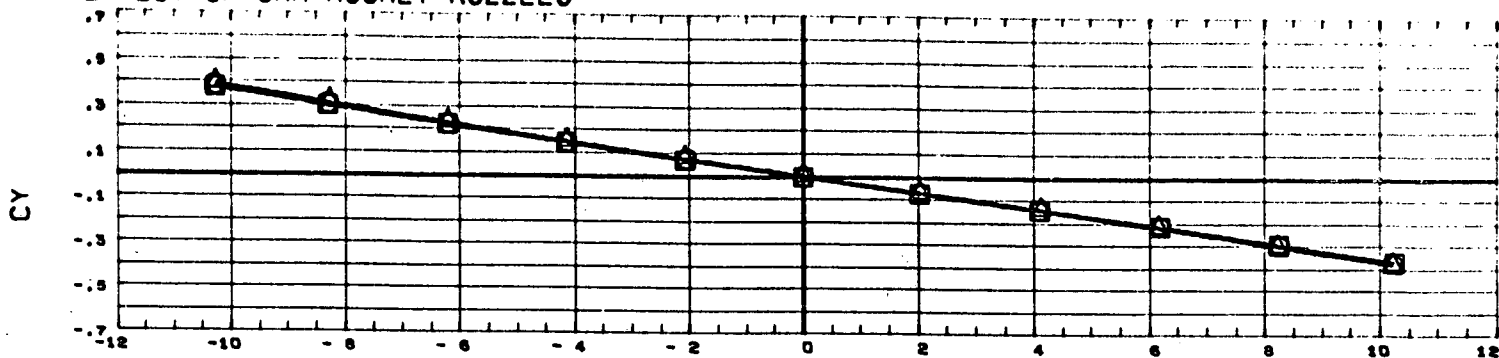
EFFECT OF SRM ROCKET NOZZLES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71119) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71120) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S6 | 0.000 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

EFFECT OF SRM ROCKET NOZZLES

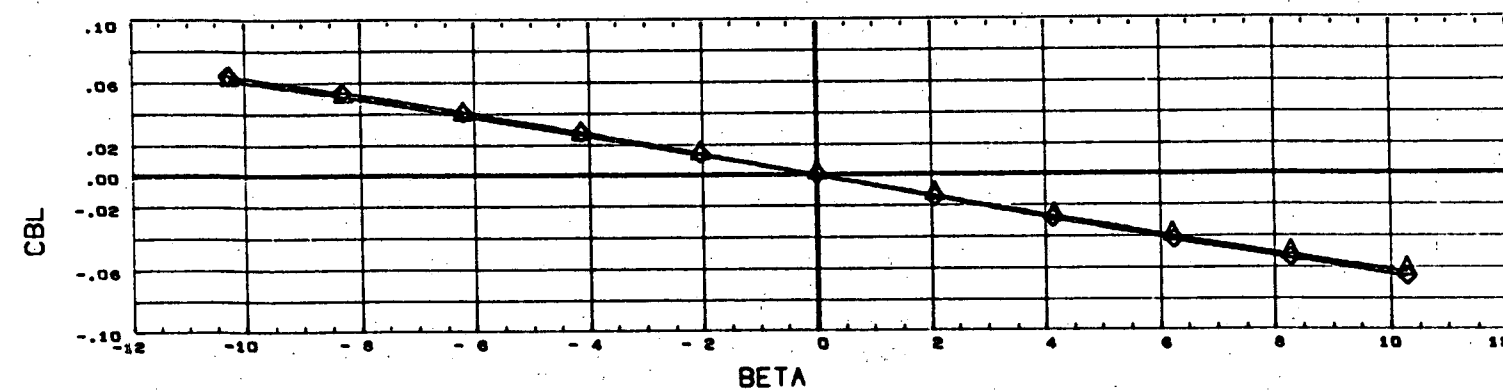
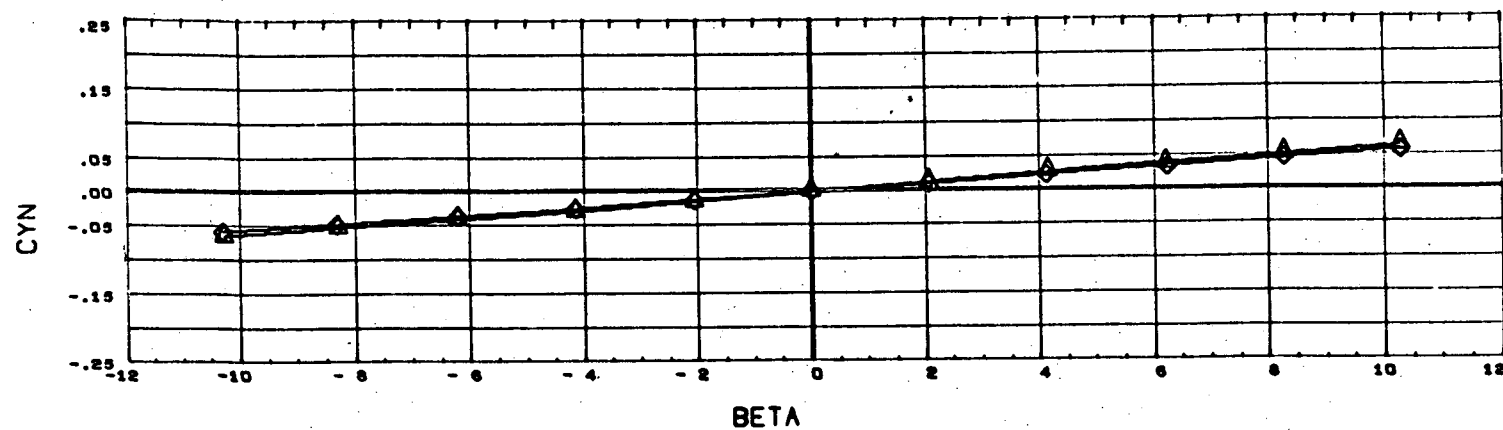
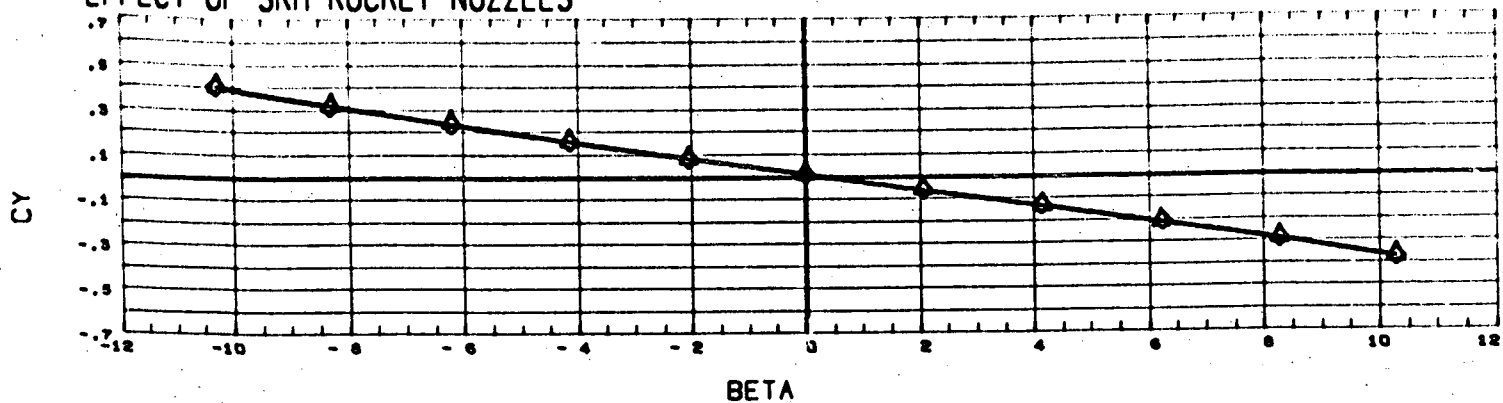


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (A71118) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 | IN. |
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| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.20

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EFFECT OF SRM ROCKET NOZZLES



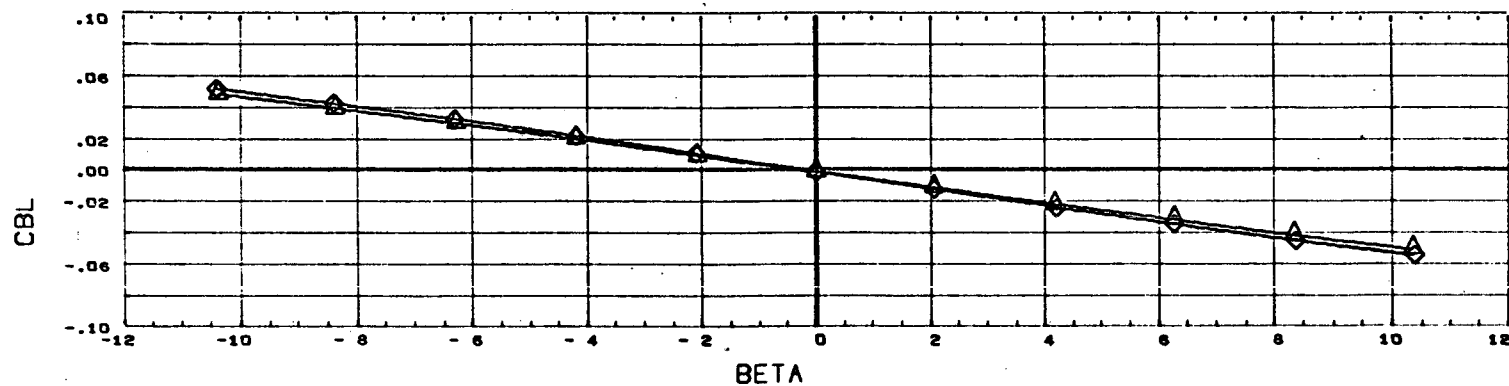
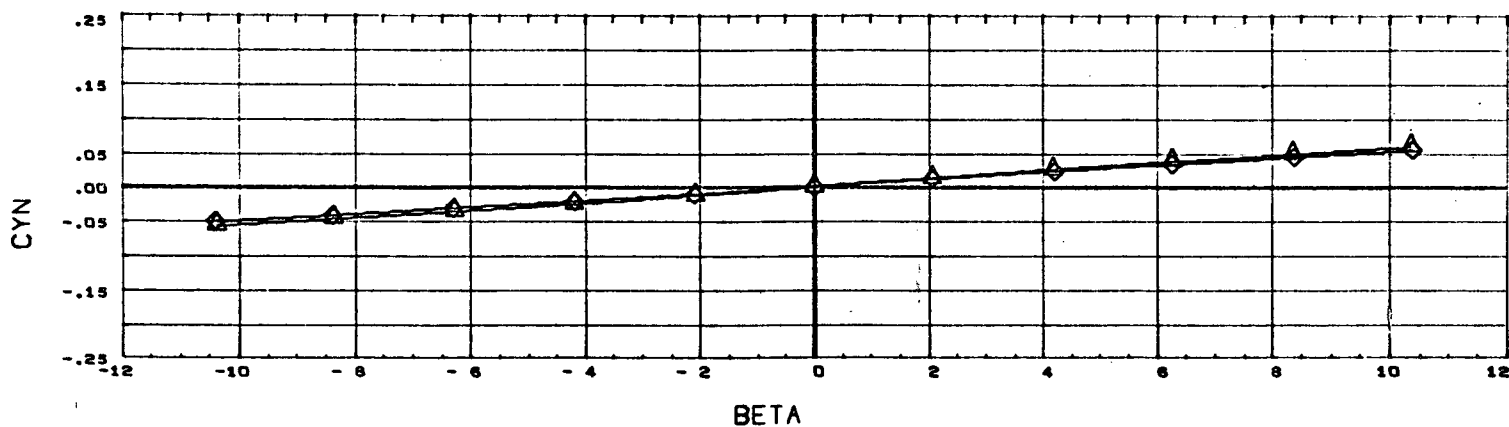
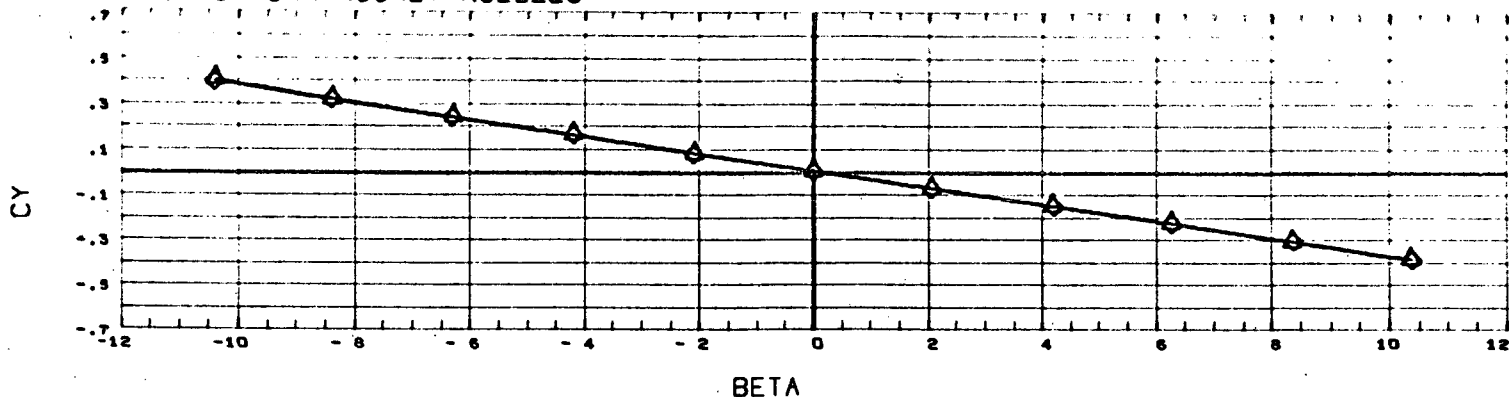
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| (A71120) | DATA NOT AVAILABLE FOR ALL CONDITIONS |

| ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | XMPP | 3.3600 IN. |
| | | | | YMPP | 0.0000 IN. |
| | | | | ZMPP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF SRM ROCKET NOZZLES

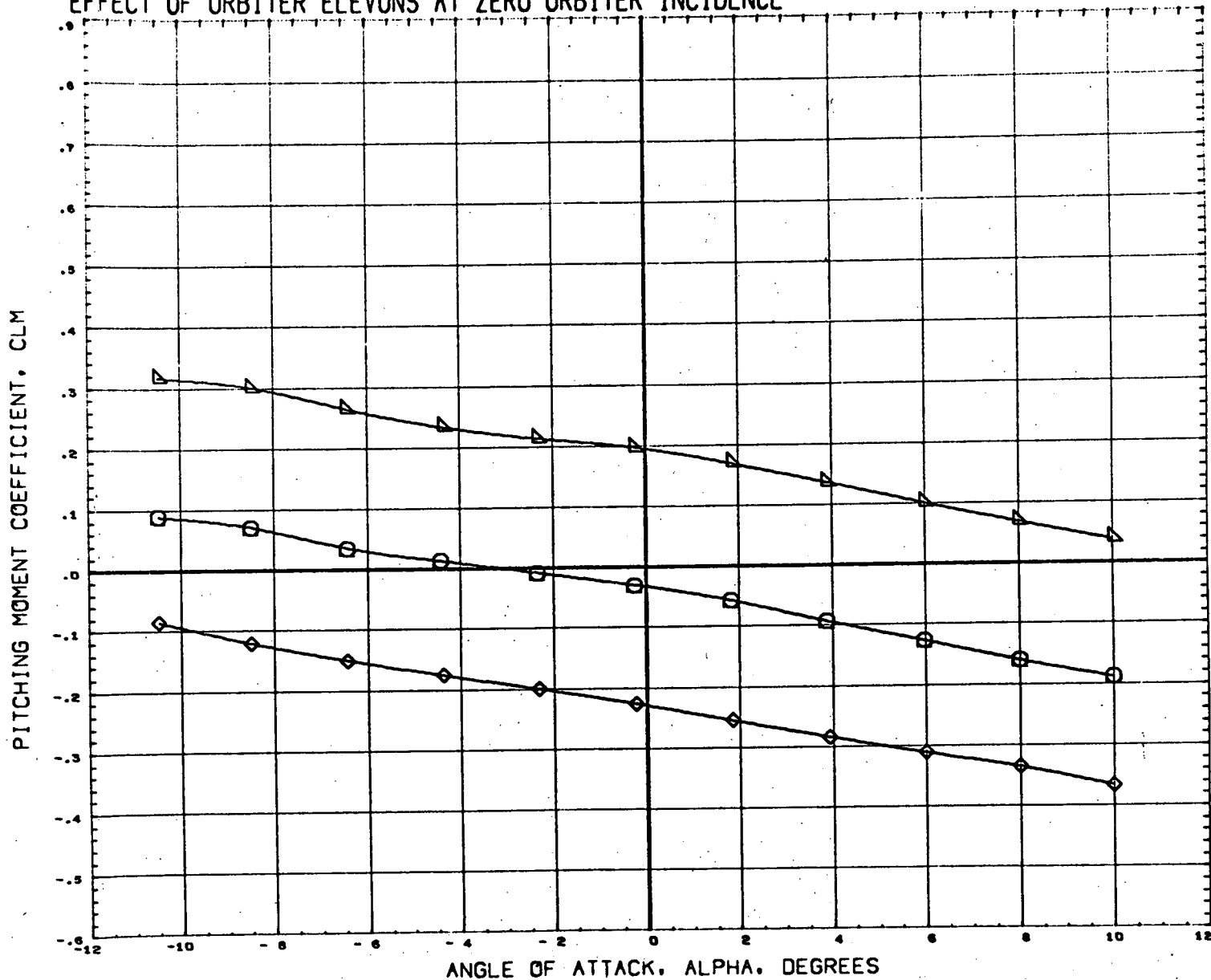


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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71118) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30256 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71120) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

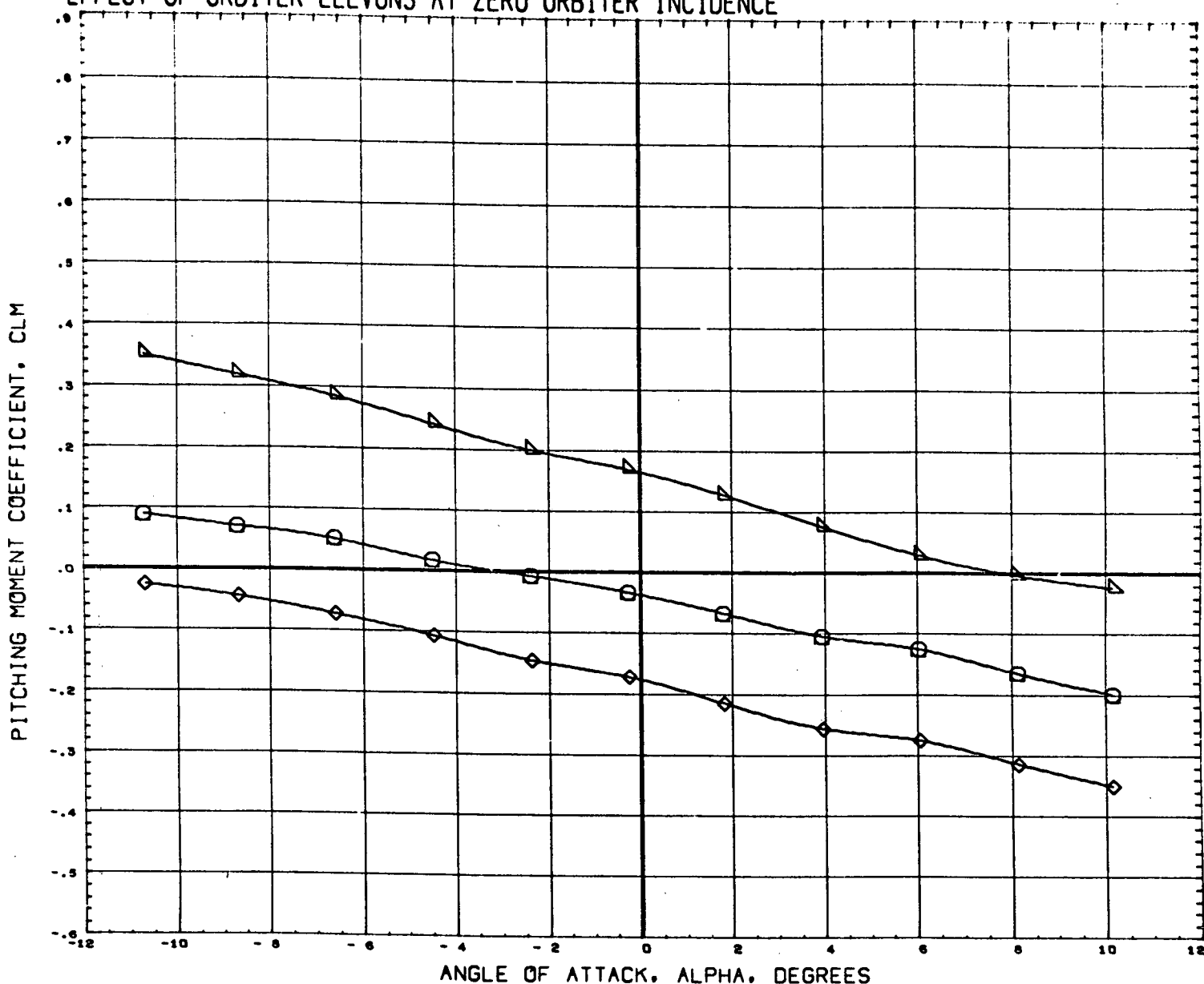
PAGE 282

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|---------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

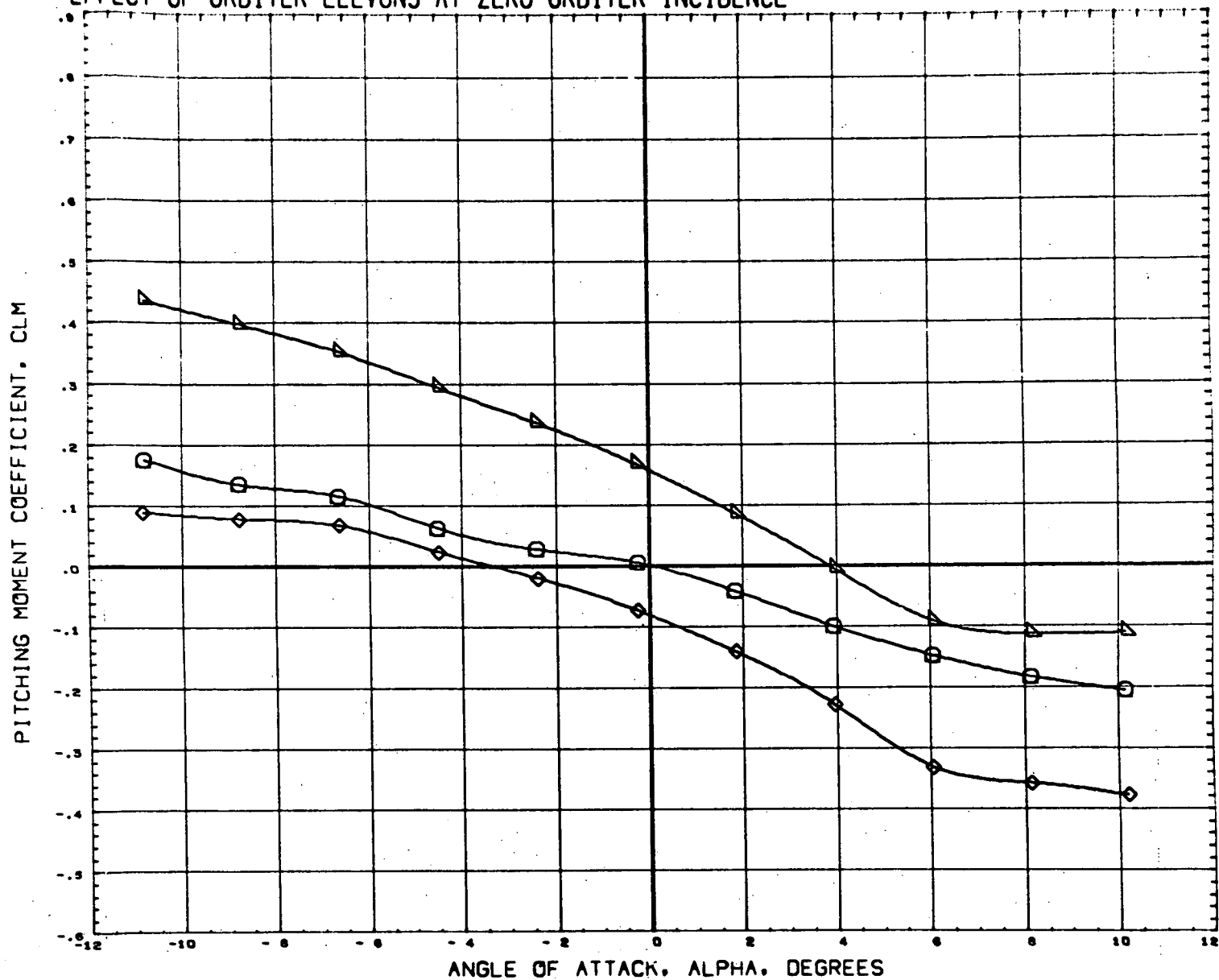
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

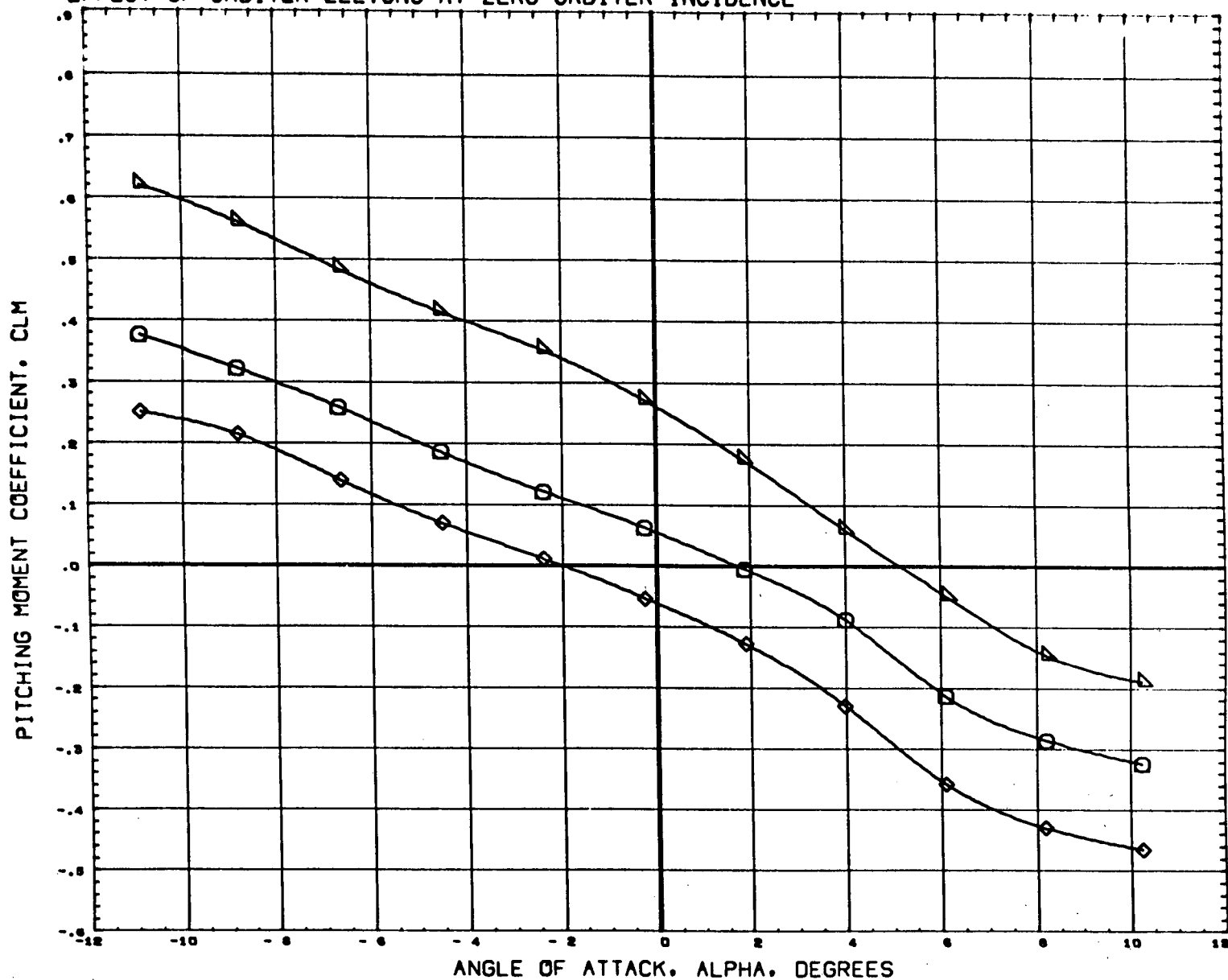


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 30. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.90

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



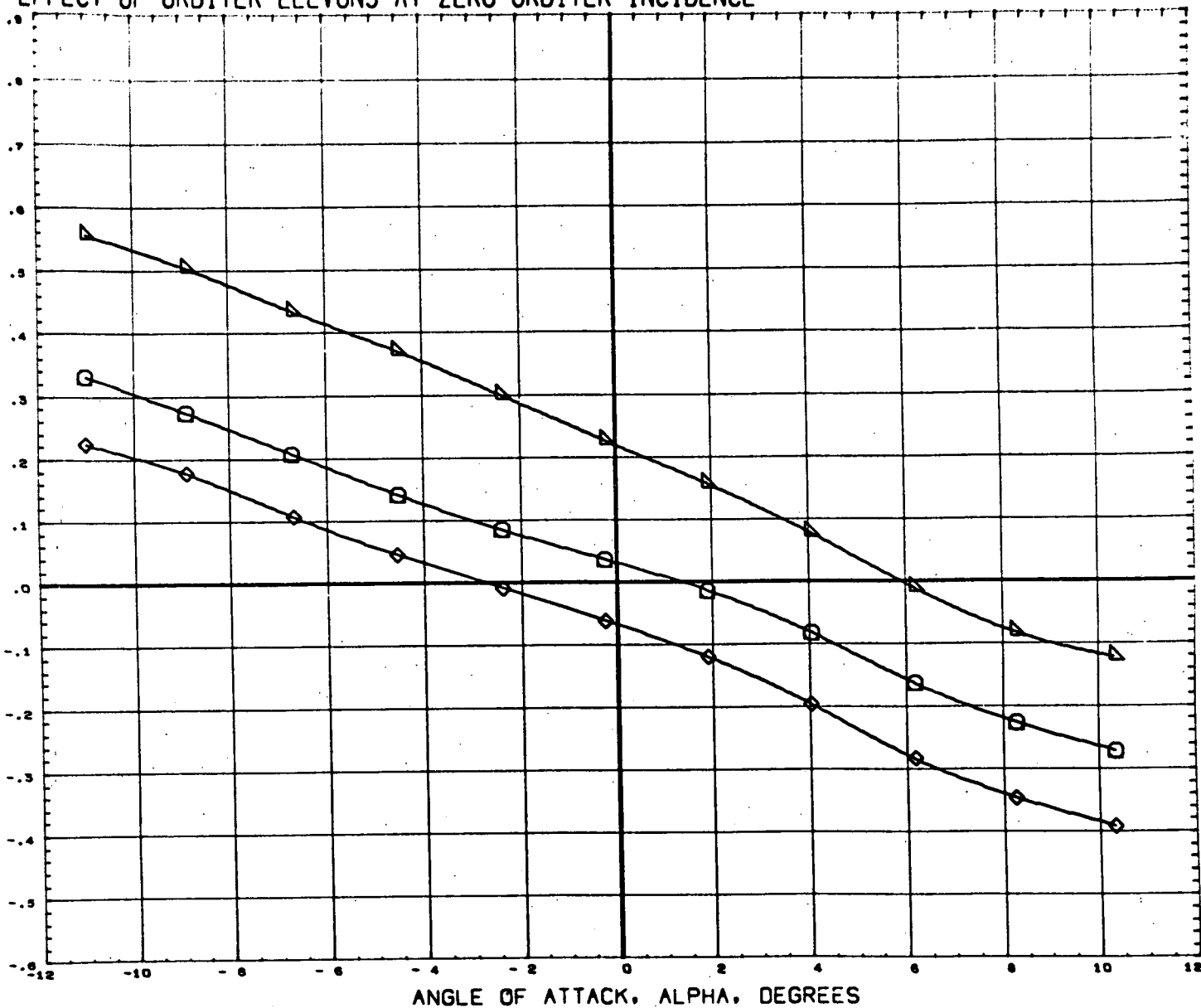
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| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

PITCHING MOMENT COEFFICIENT, CLM



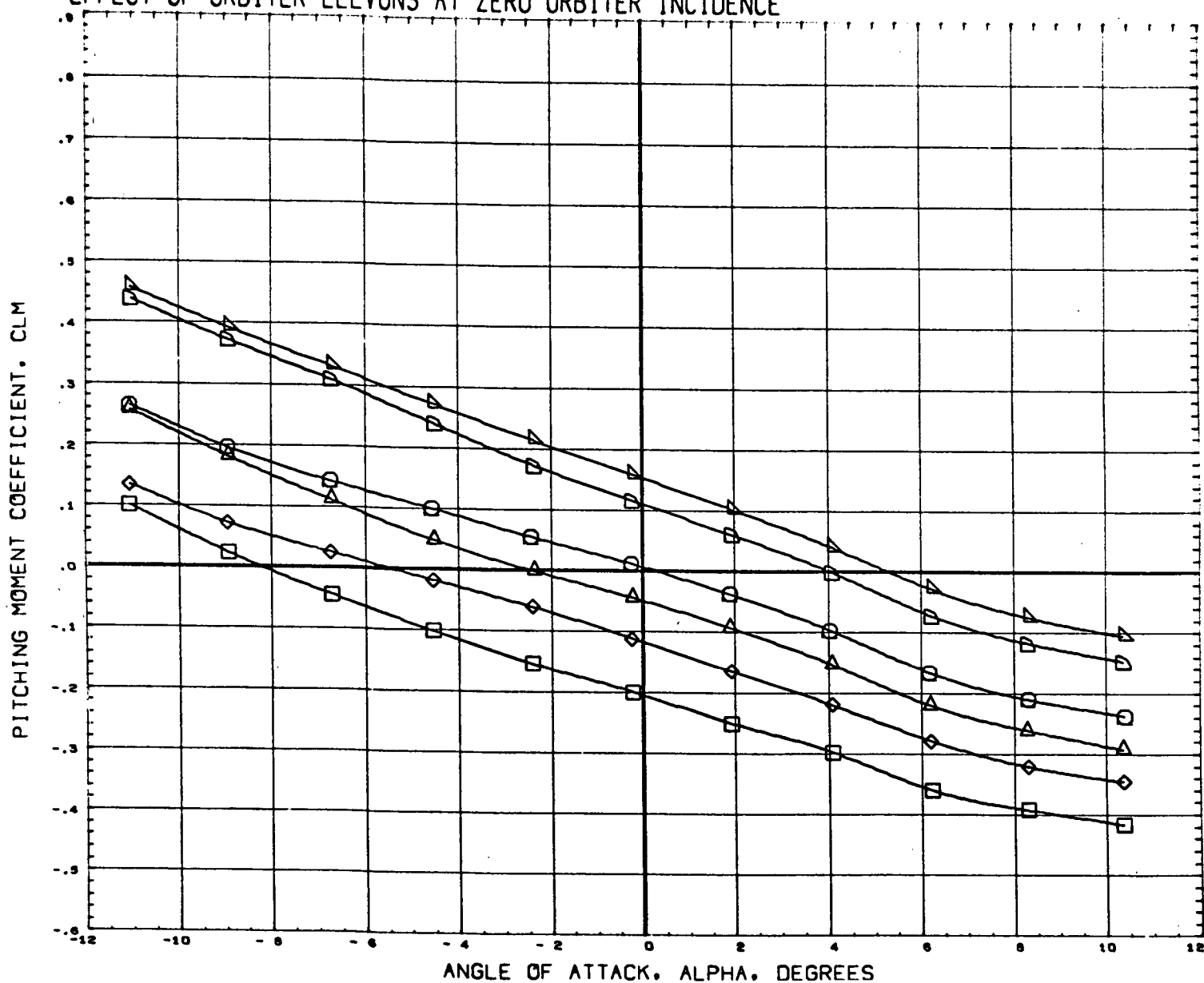
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|-----------------|---|---------|-------|---------|--------|-----------------------|----------------|
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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.10

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

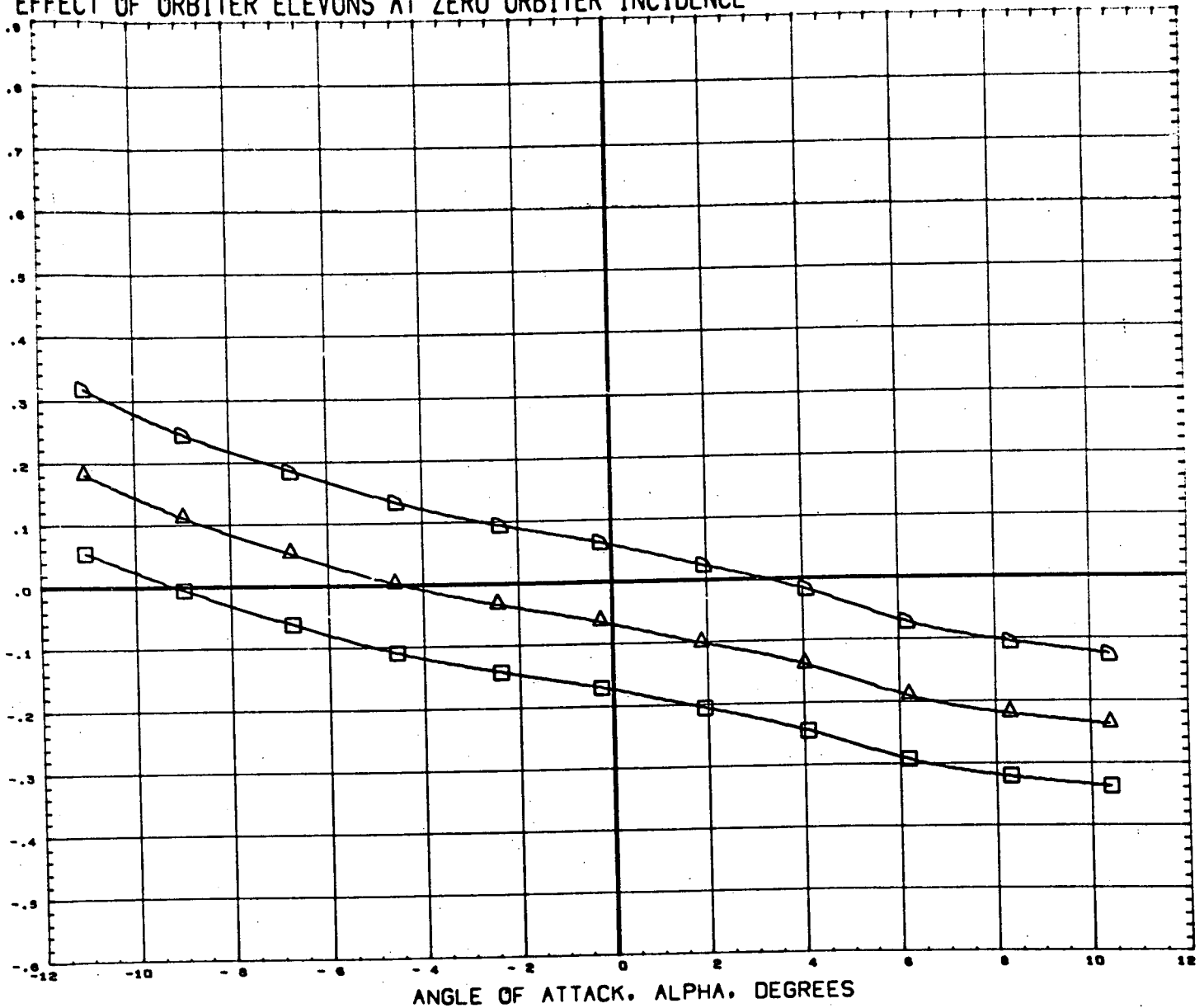


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 | IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 | IN. |
| (871101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.20

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

PITCHING MOMENT COEFFICIENT, CLM

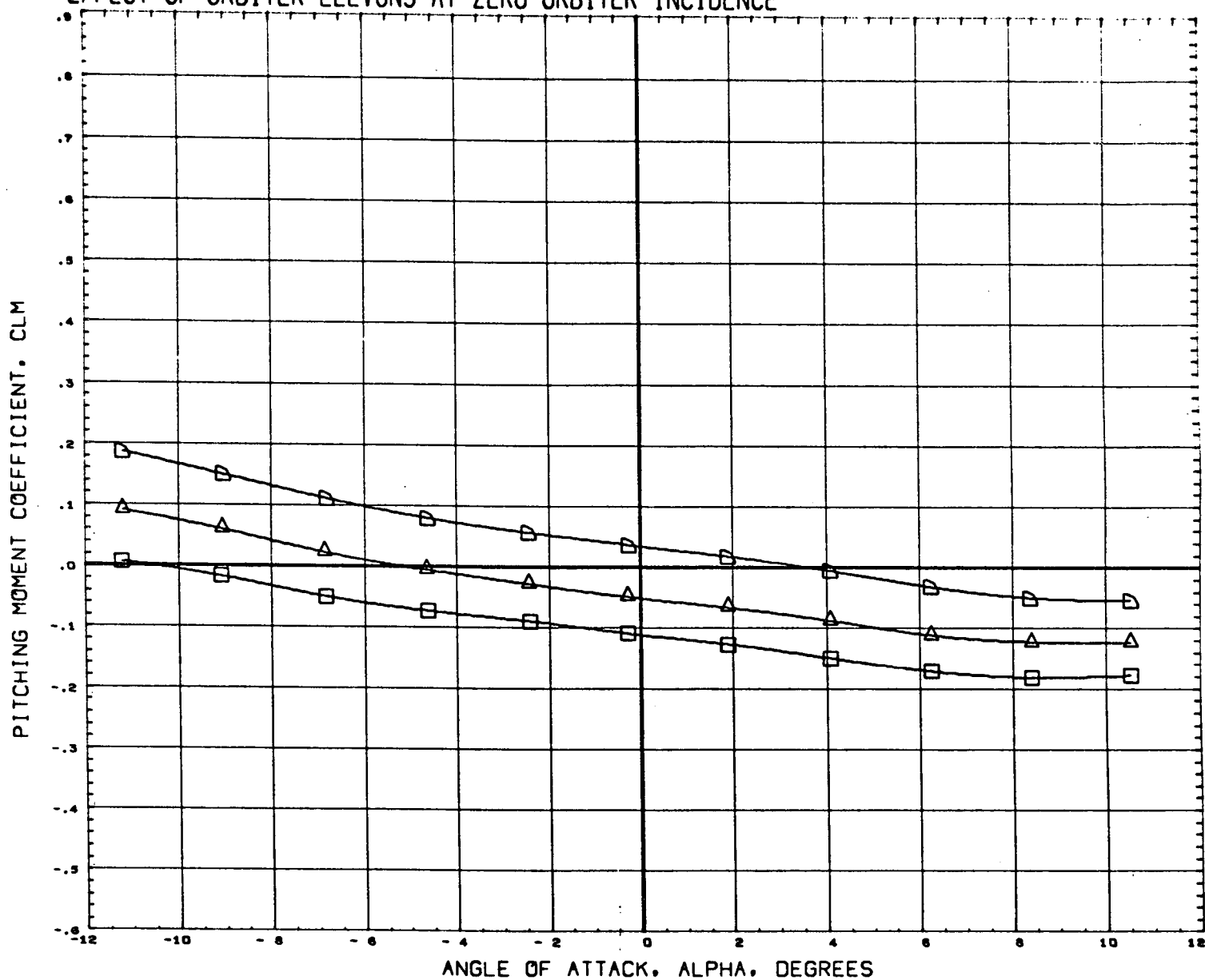


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

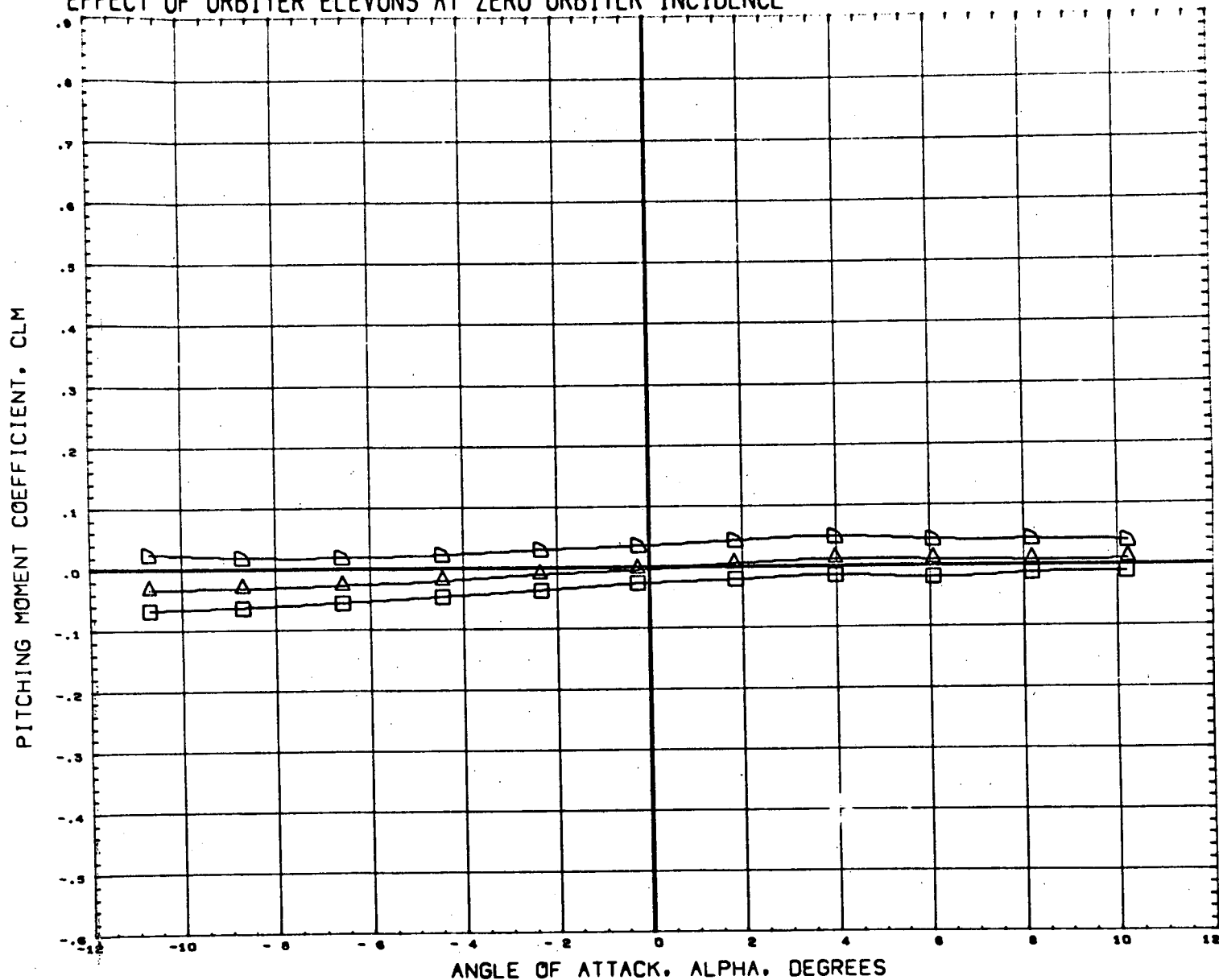


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

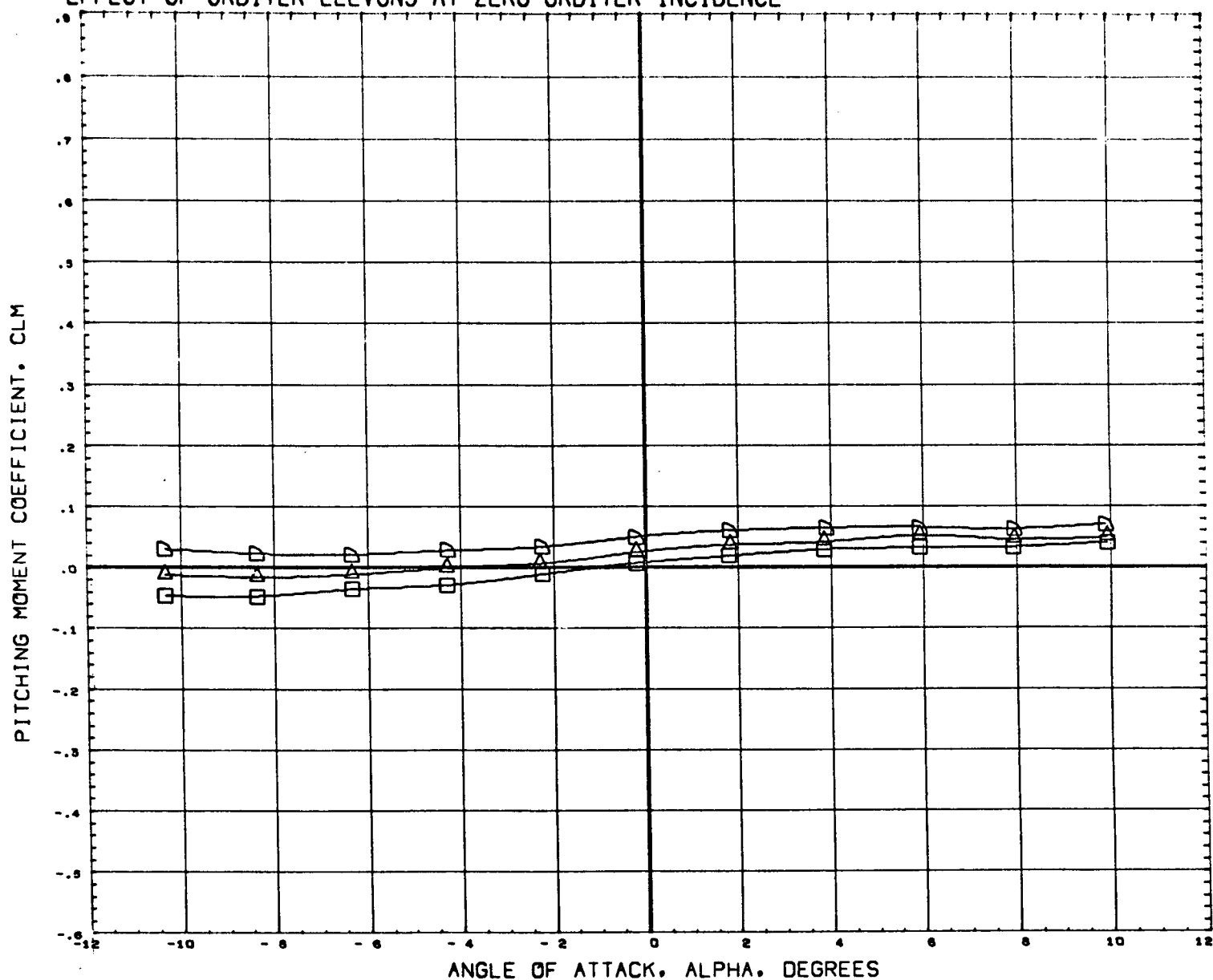


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 | 50. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 3.48

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

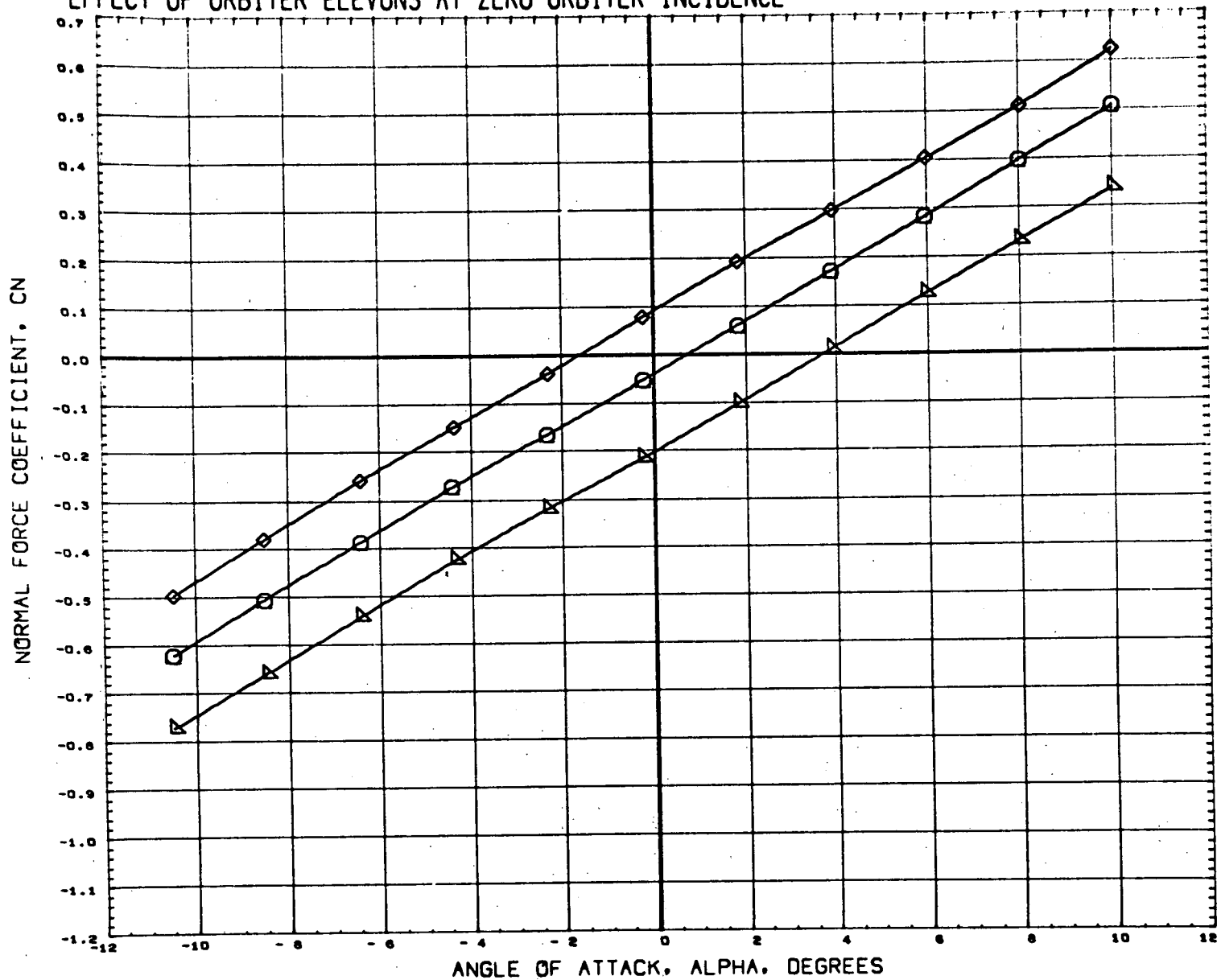


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH 4.96

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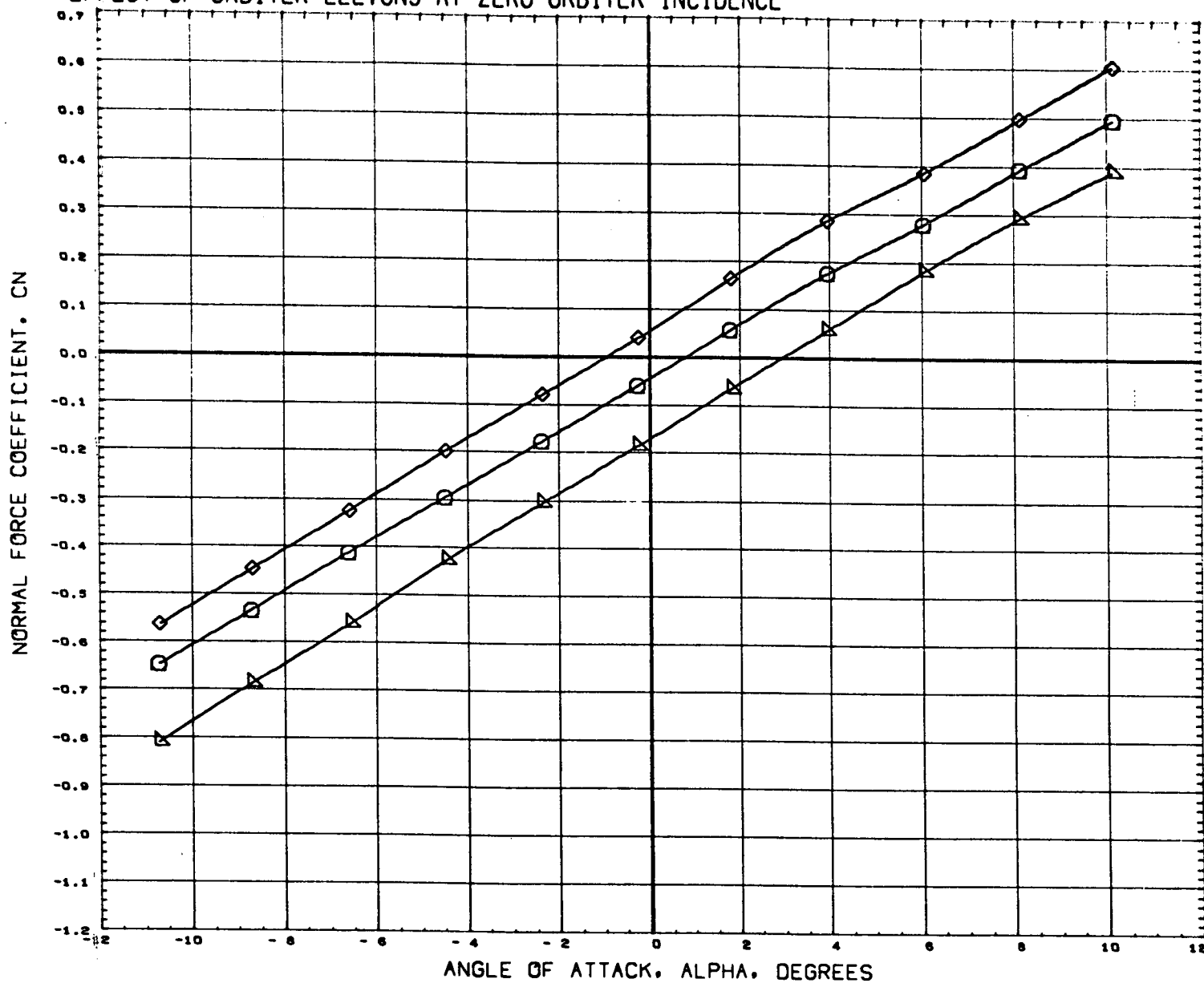
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | 10.000 | BREF | 4.4600 IN. |
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | 10.000 | XMRP | 3.3600 IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | -10.000 | YMRP | 0.0000 IN. |
| (871101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | -10.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

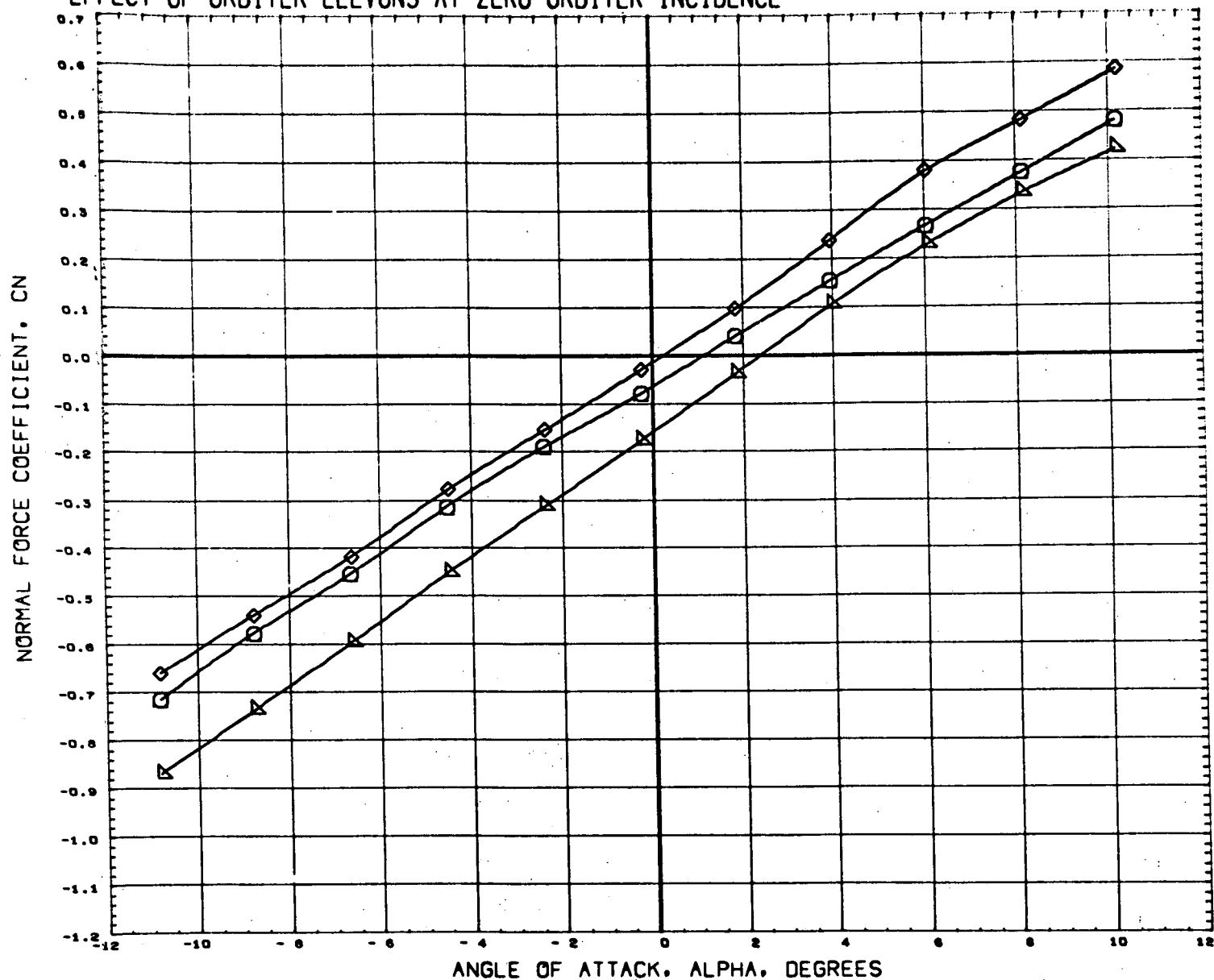
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH .80

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

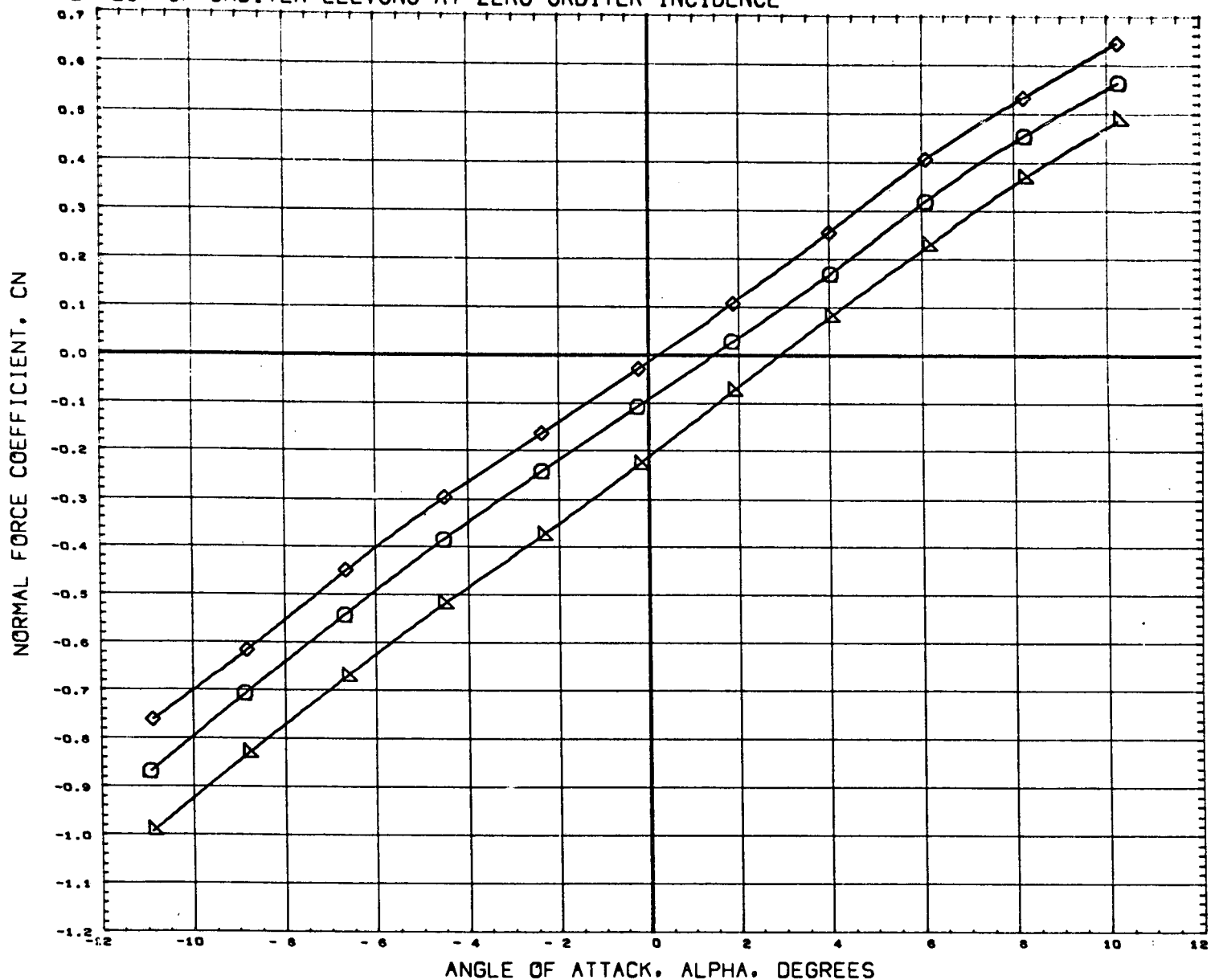


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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

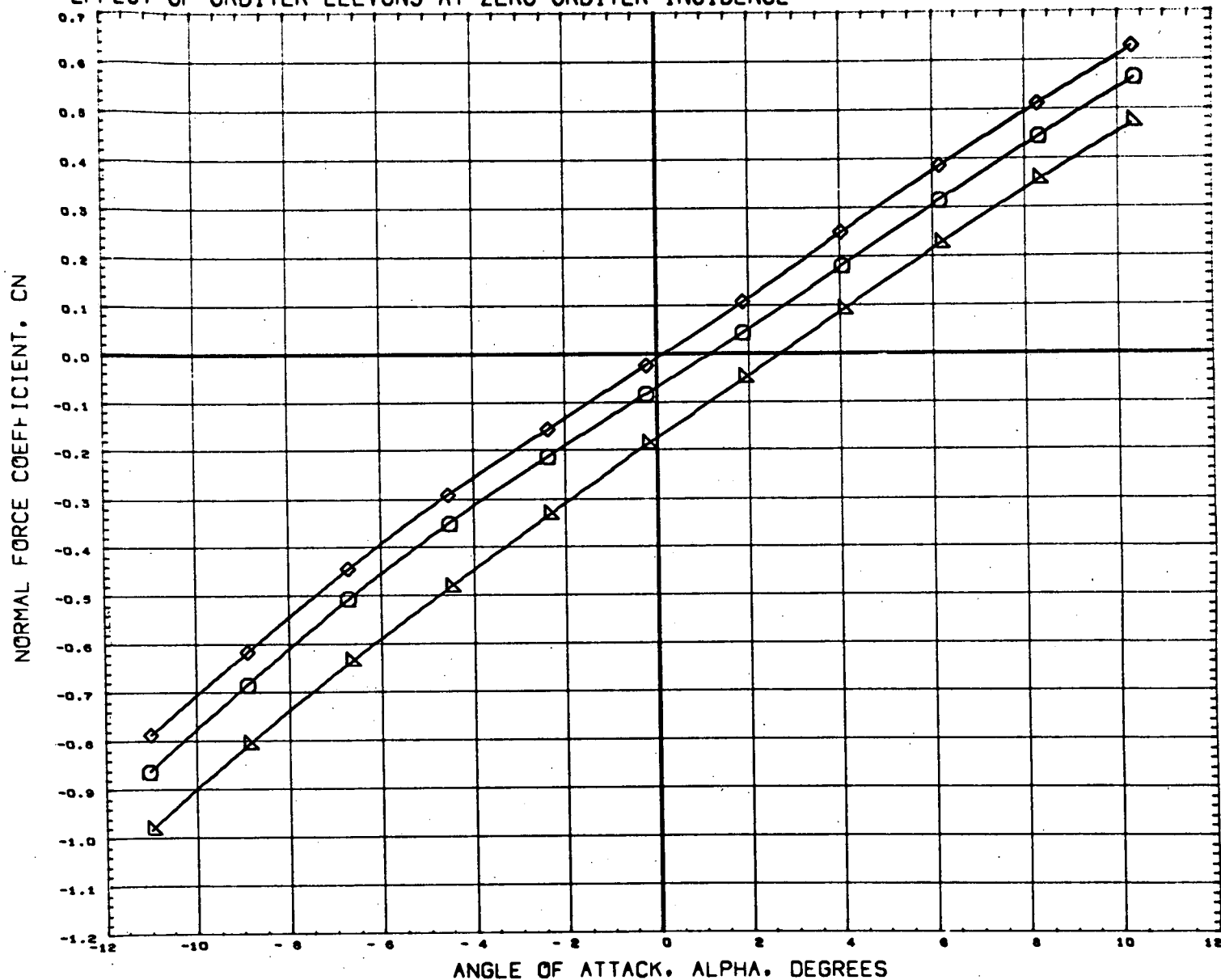


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| (B71103) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 | IN. |
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| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.00

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

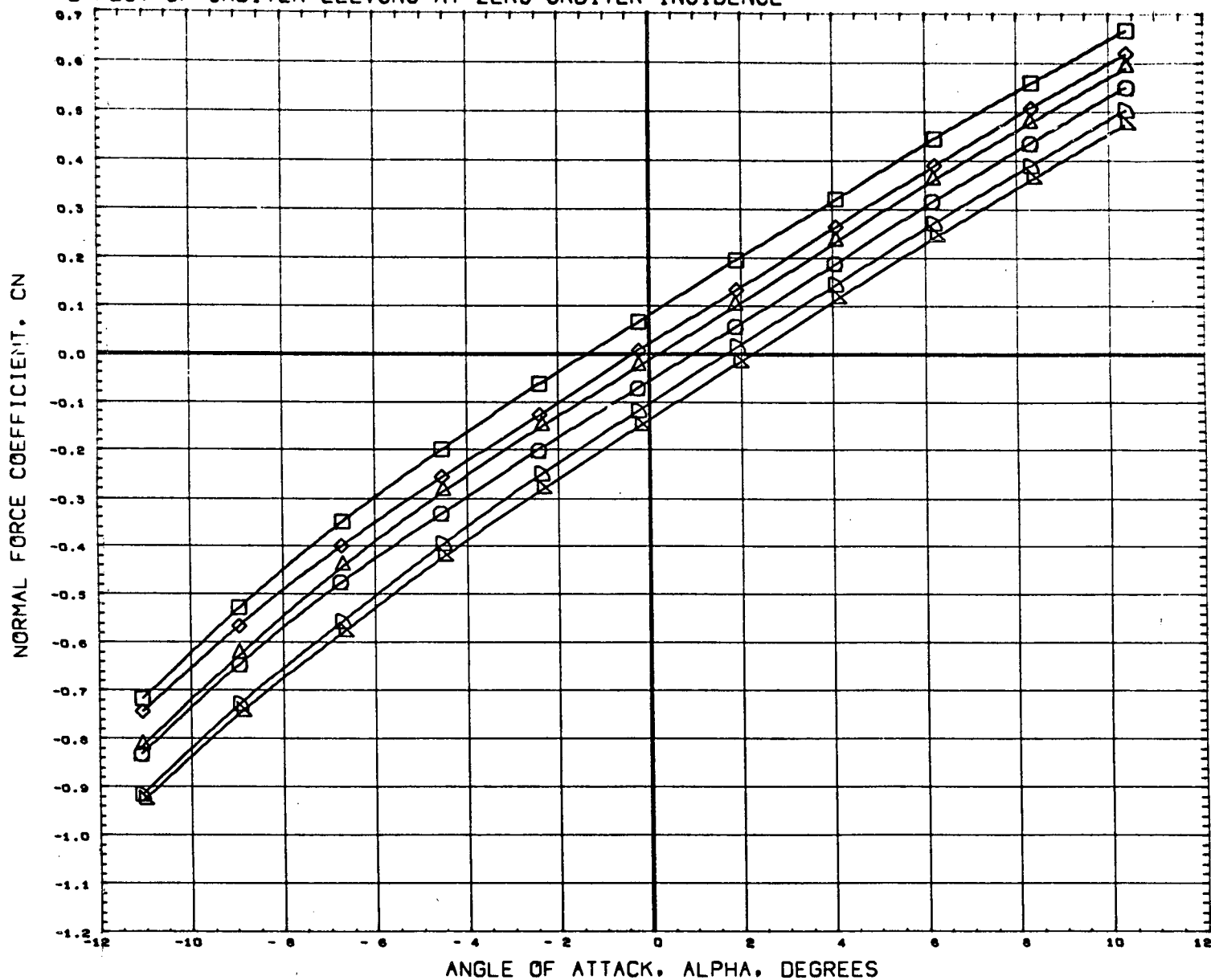


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| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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MACH 1.10

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

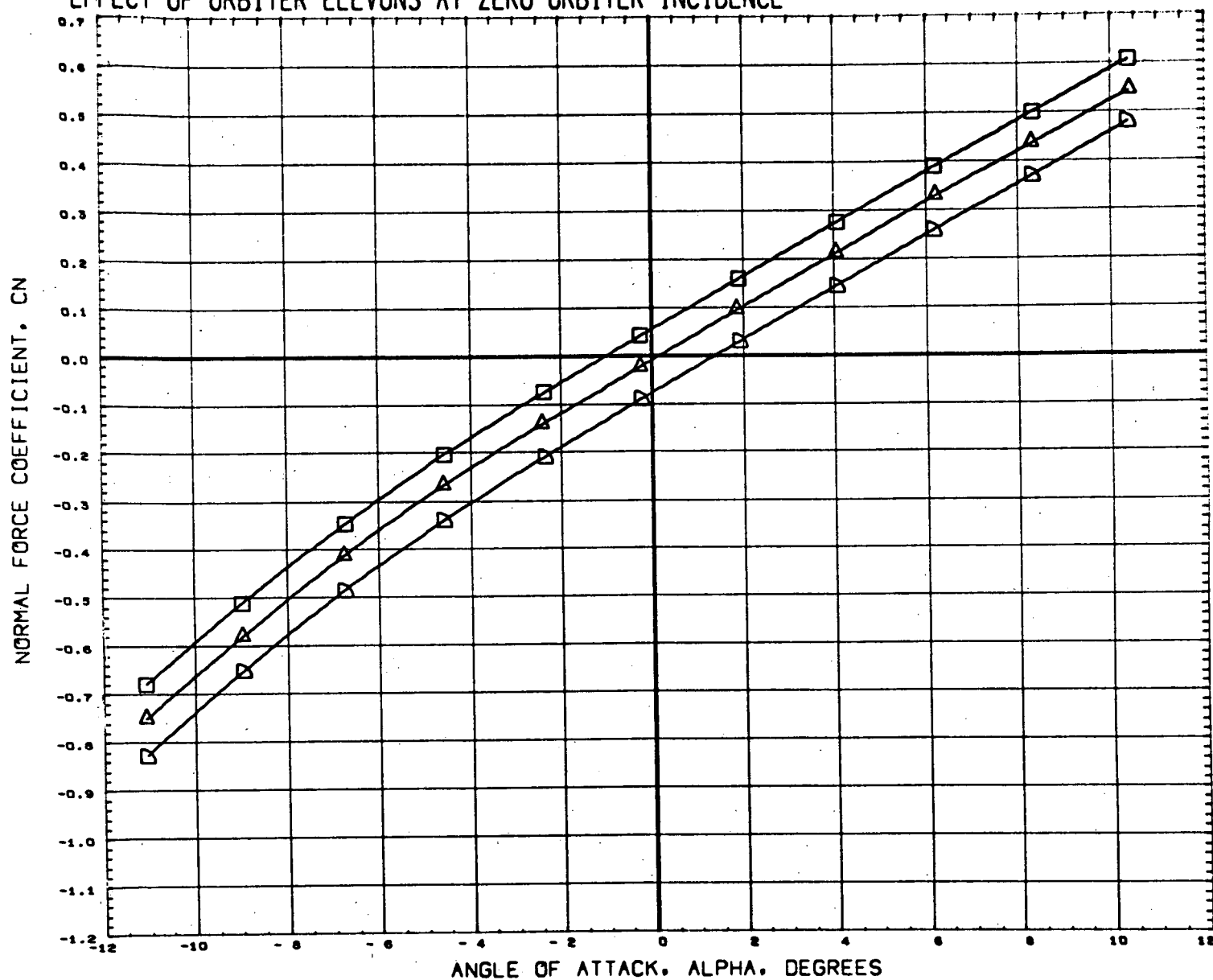


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| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 | IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 | IN. |
| (871101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF | 0.2480 | IN. |
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MACH 1.20

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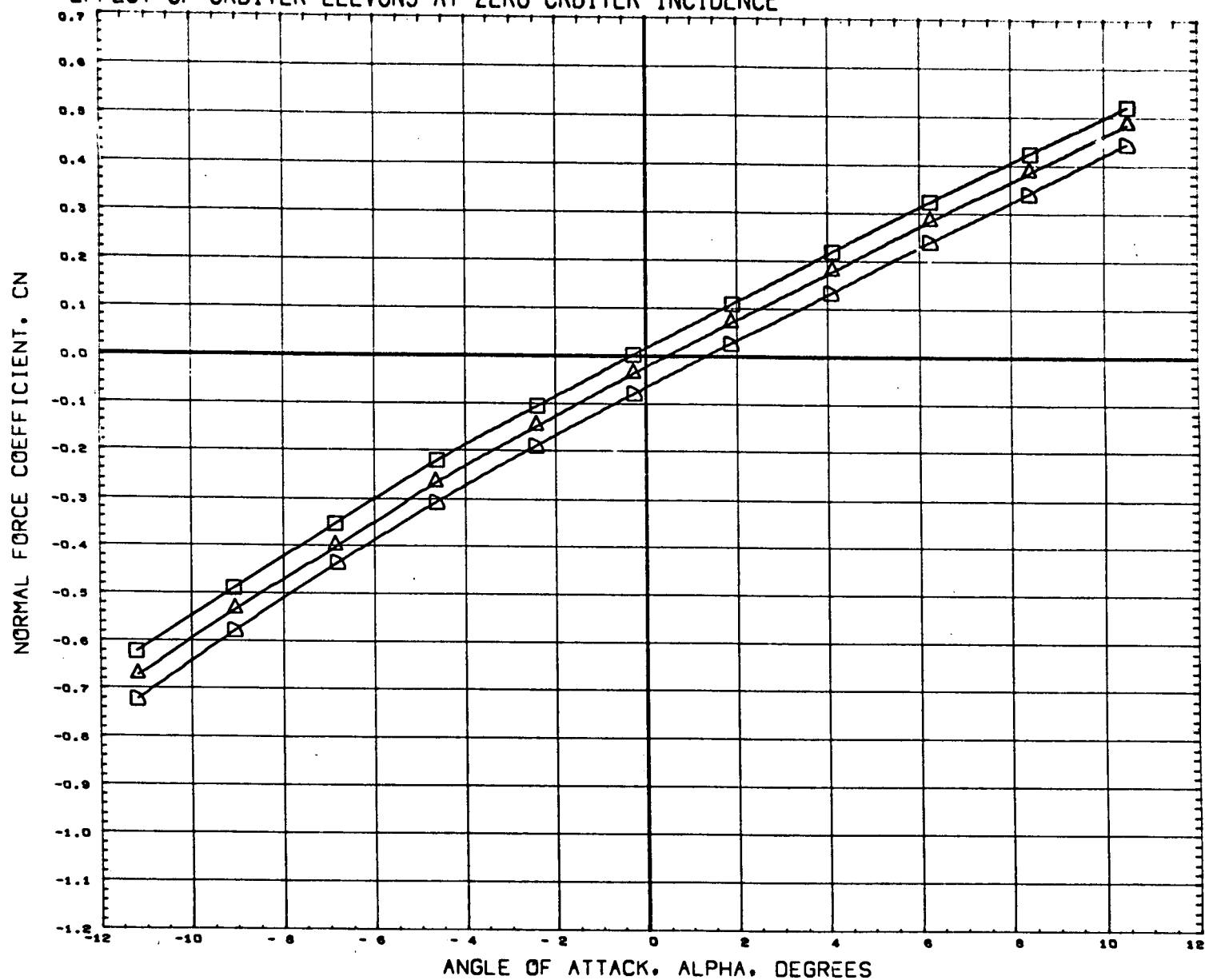
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (871097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
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MACH 1.46

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

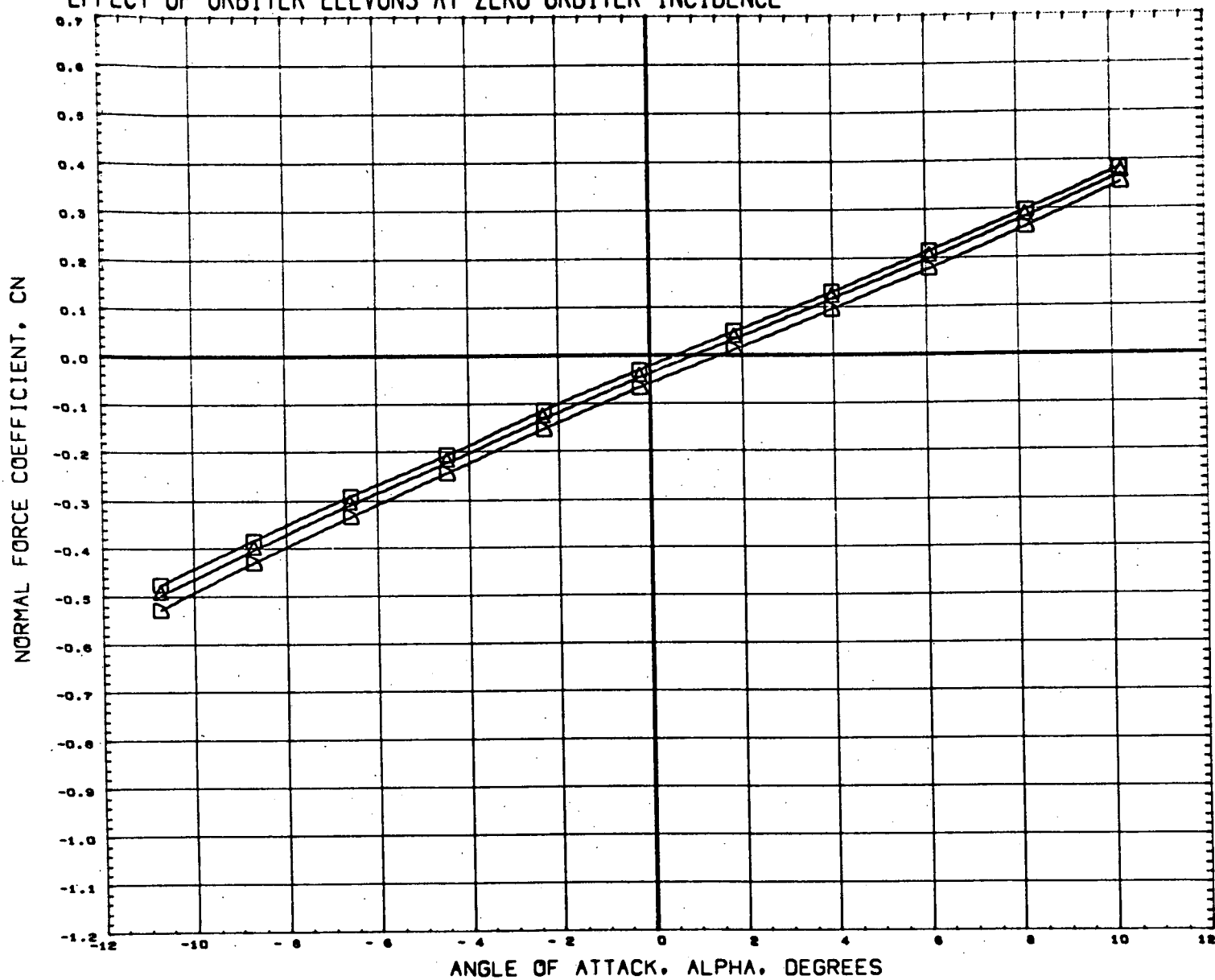


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| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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MACH 1.95

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

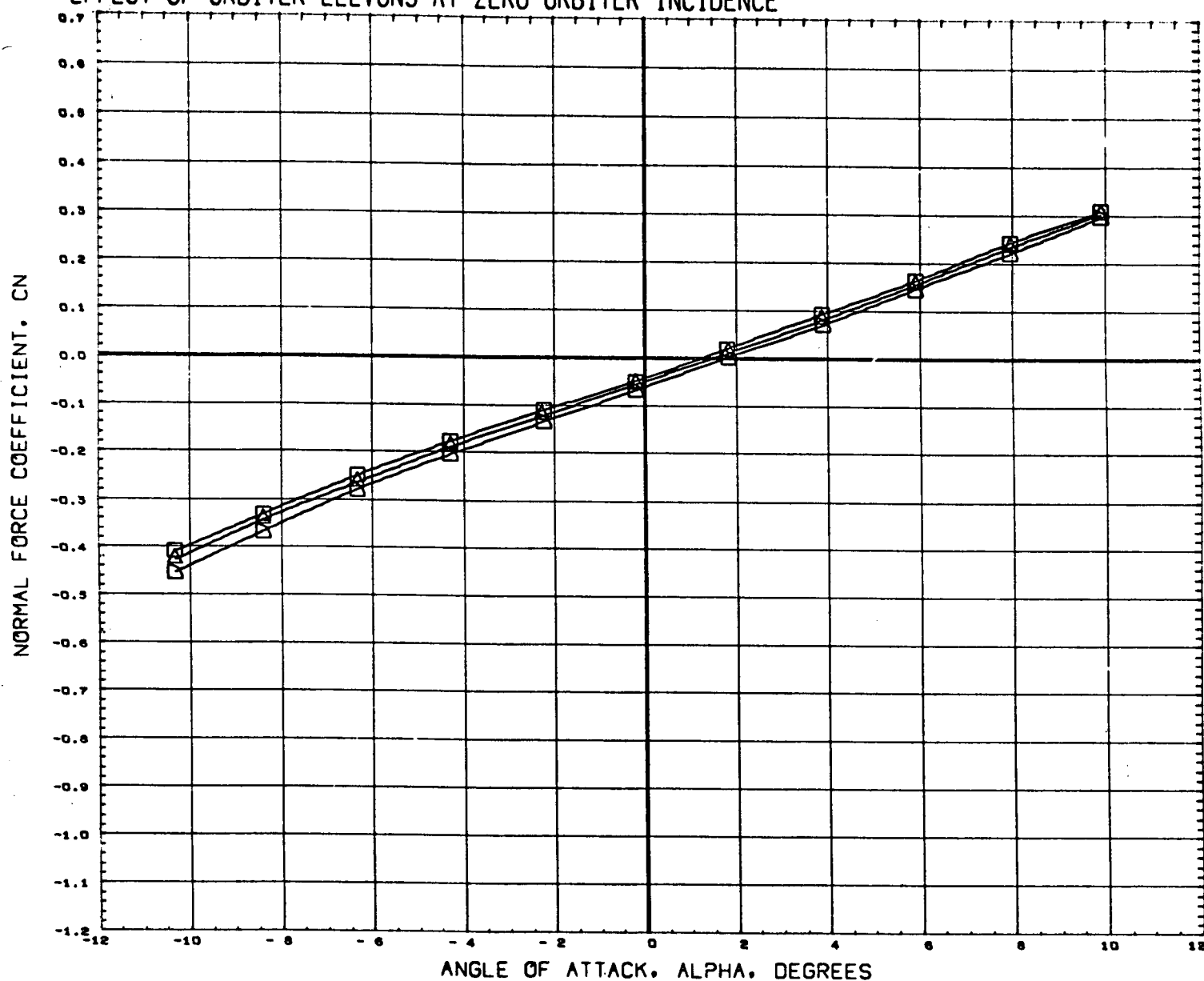


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| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BRF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF | 0.2480 IN. |
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MACH 3.48

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

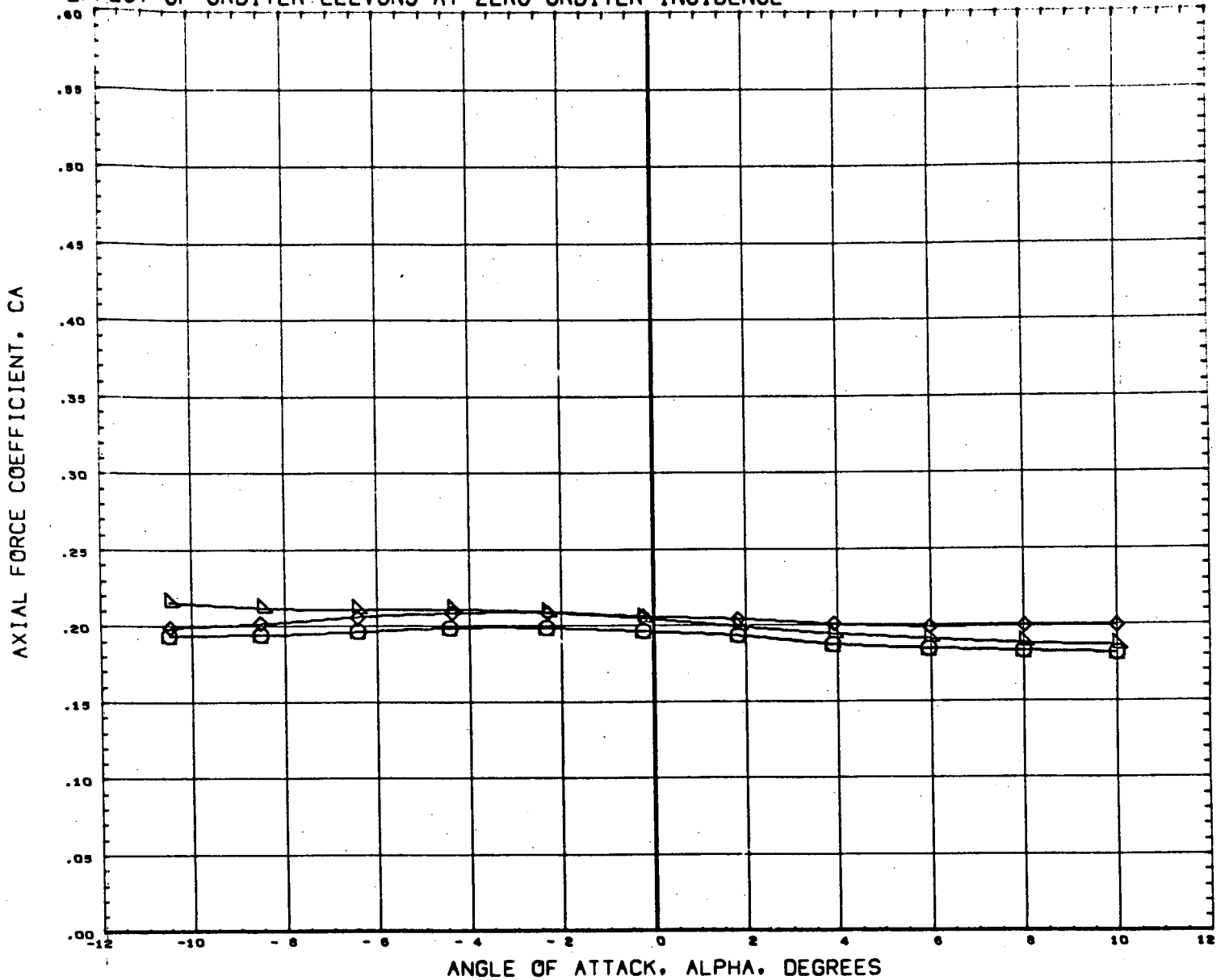


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| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 | IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 | IN. |
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MACH 4.96

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



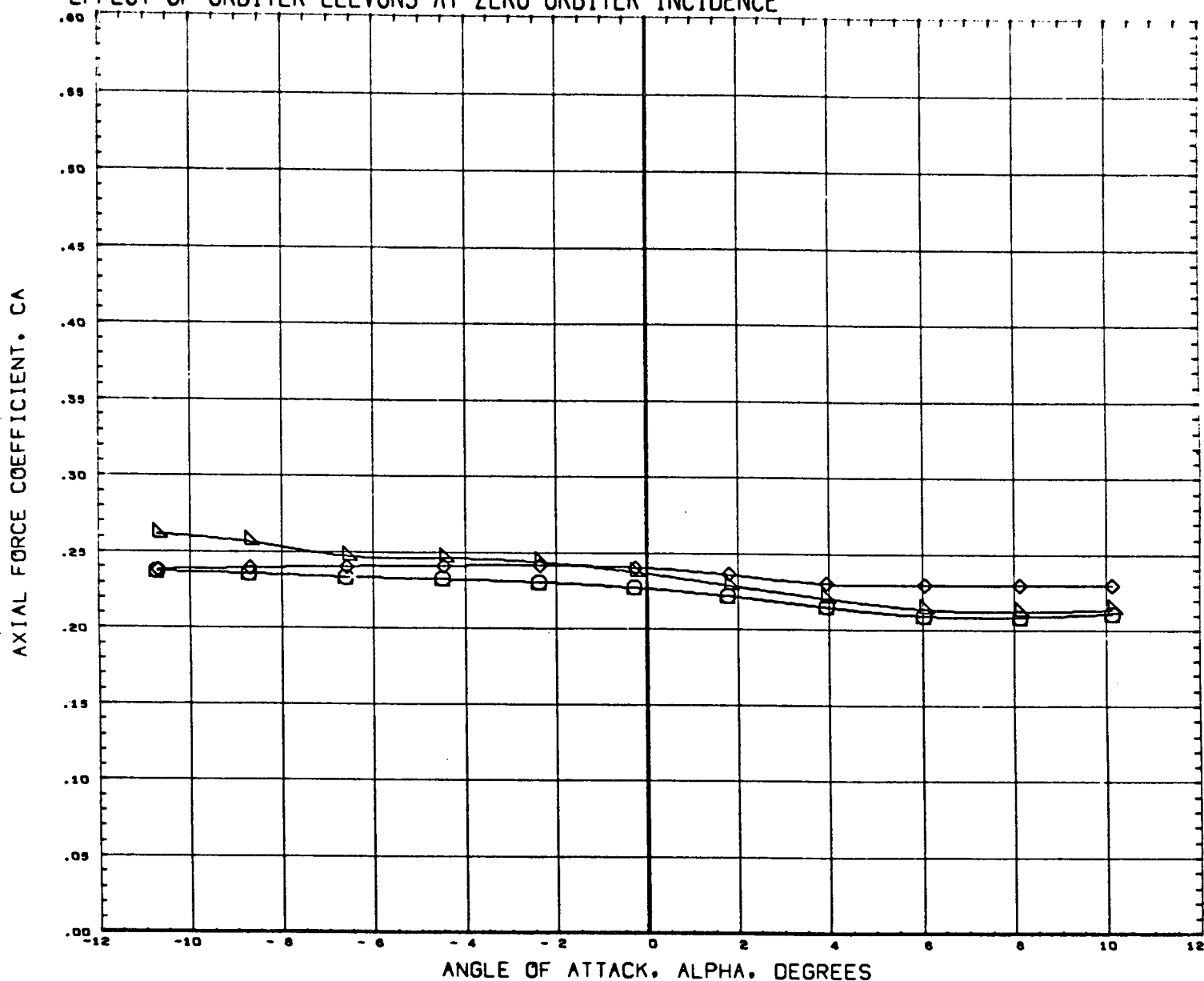
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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XHRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YHRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP | 0.2460 IN. |
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MACH

.60

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

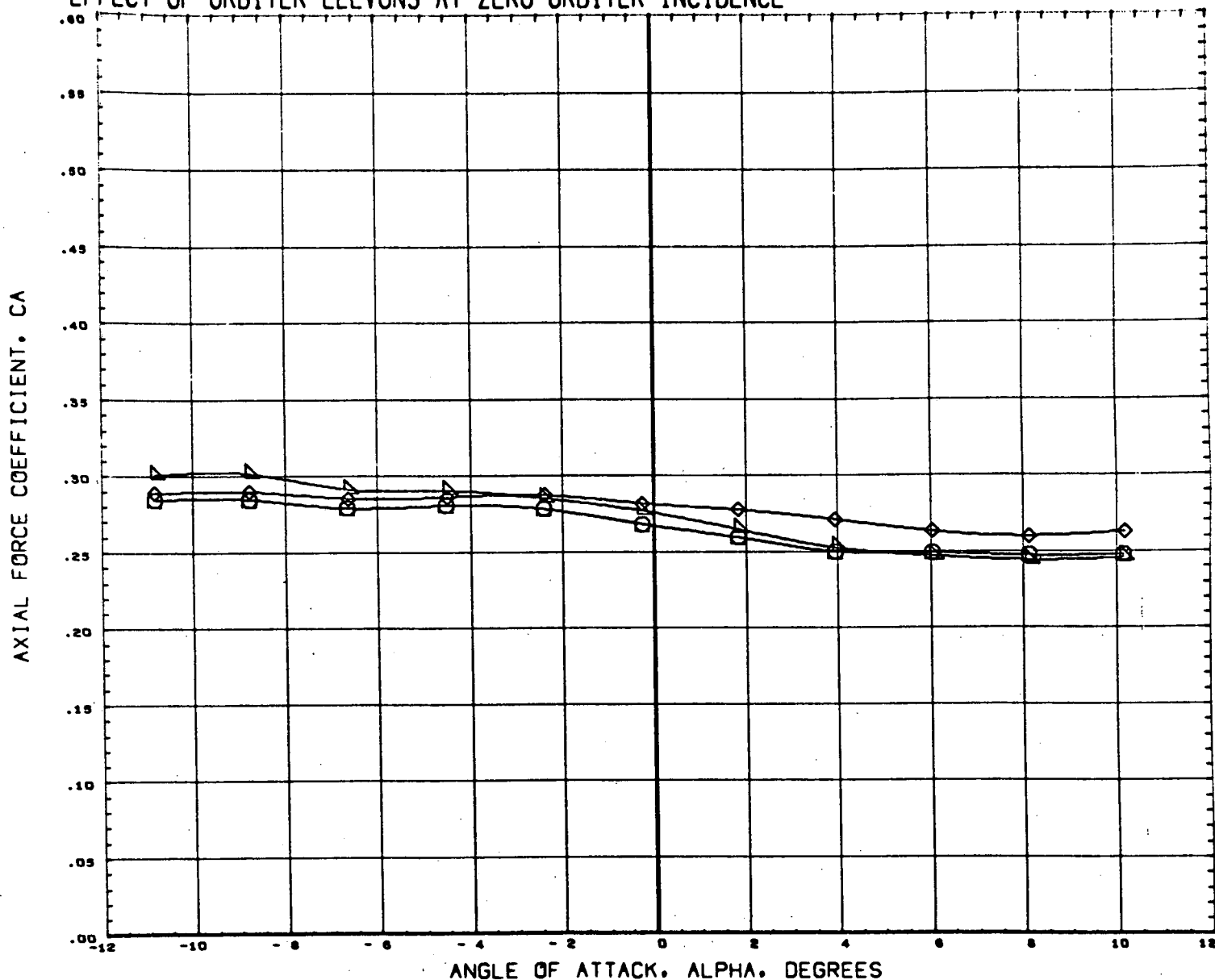


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH .80

PAGE 304

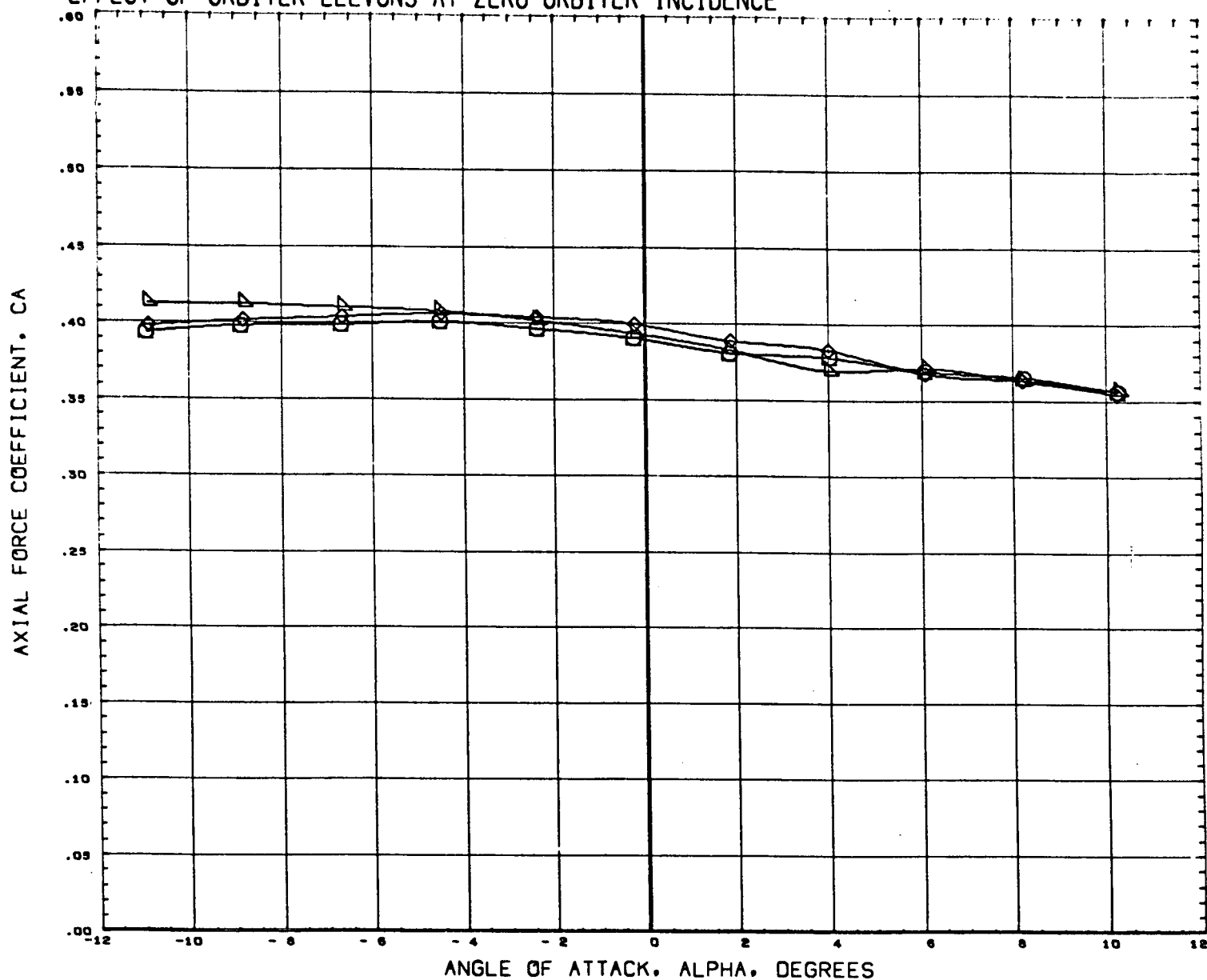
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET | SYMBOL | CONFIGURATION DESCRIPTION | ORBITER INC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|----------|--|---|-------------|-------|---------|--------|-----------------------|----------------|
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| (871091) | | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0280 IN. |
| (871097) | | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREP | 4.4600 IN. |
| (871099) | | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871101) | | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH .90

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

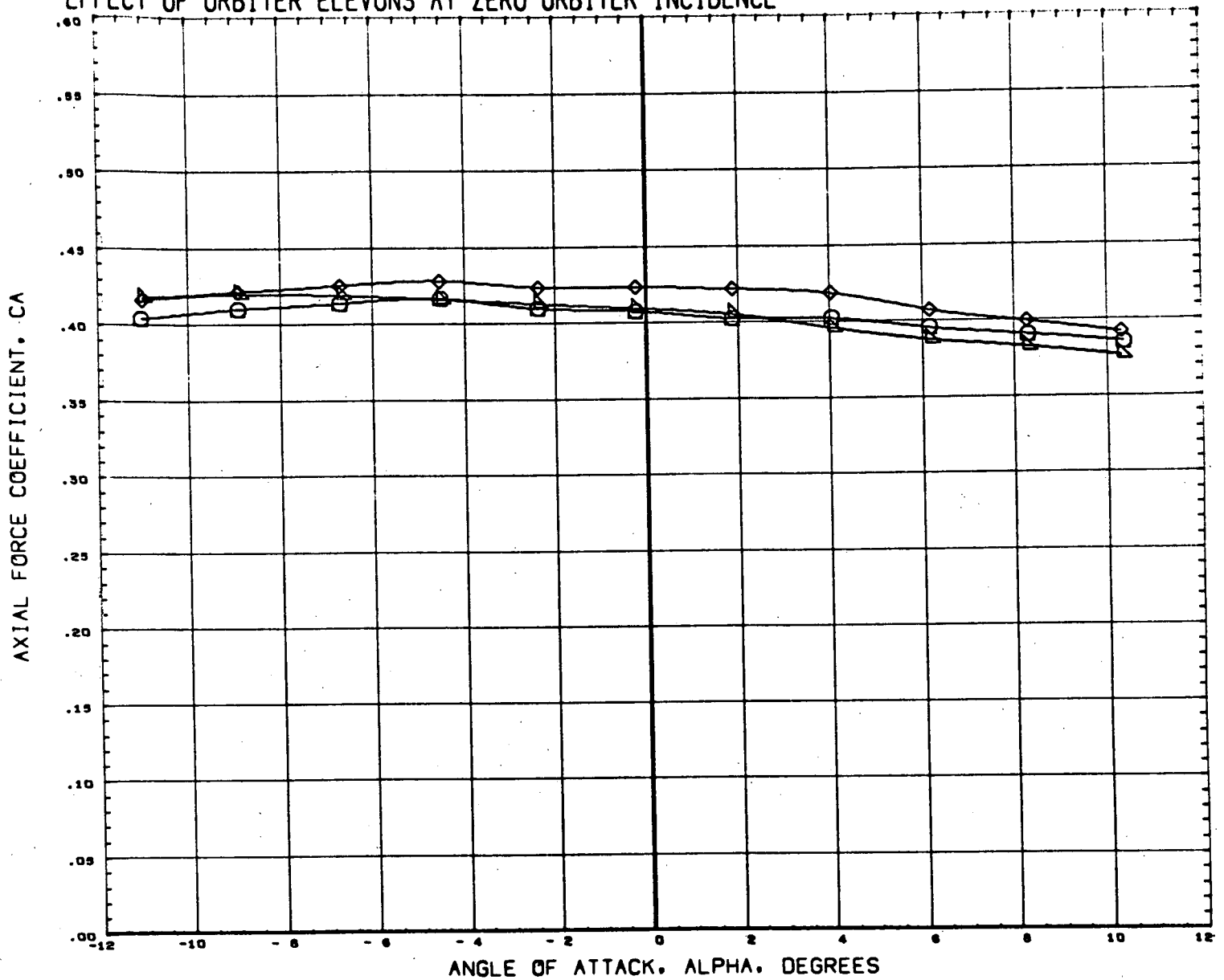


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH 1.00

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

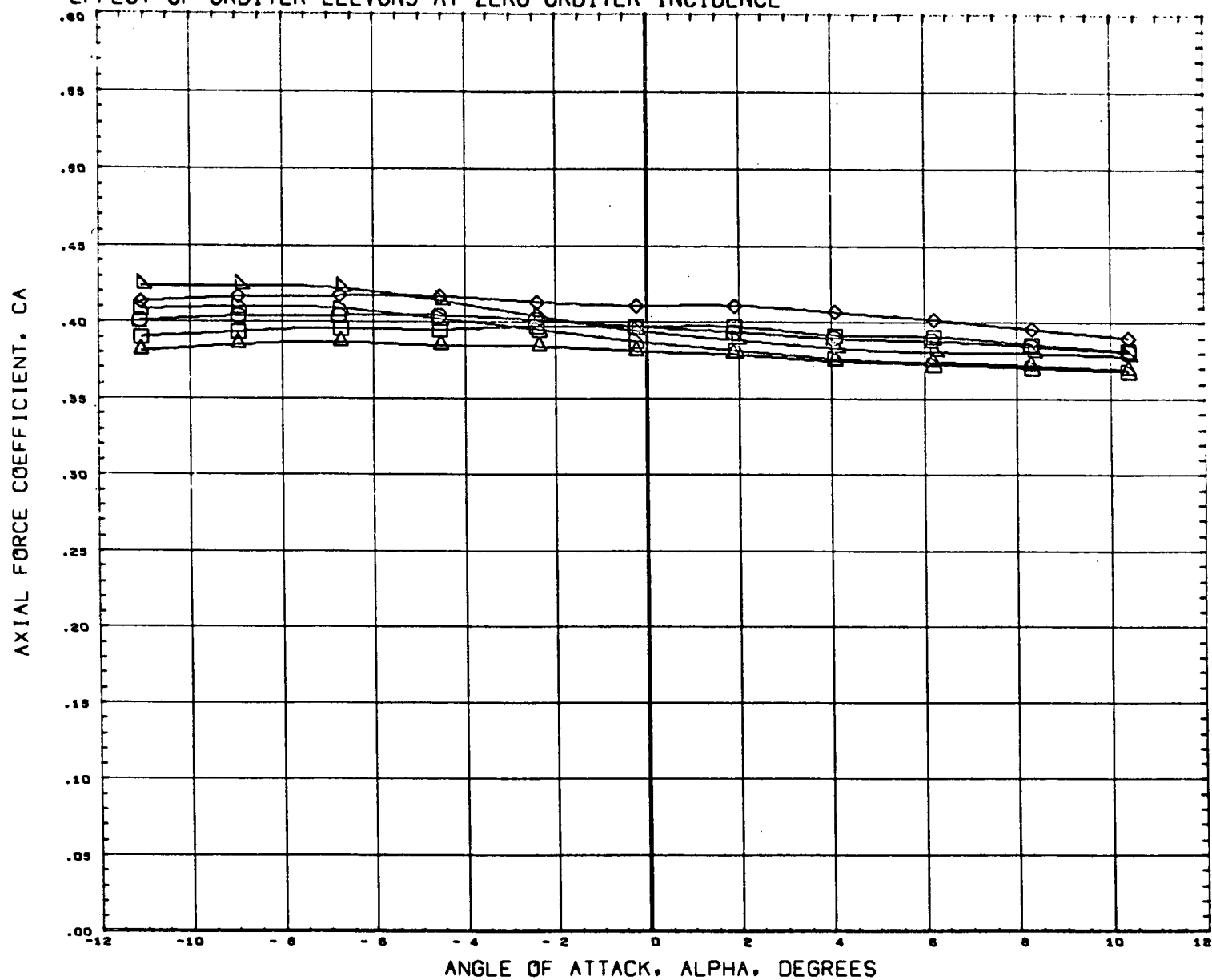


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|---------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
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MACH 1.10

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



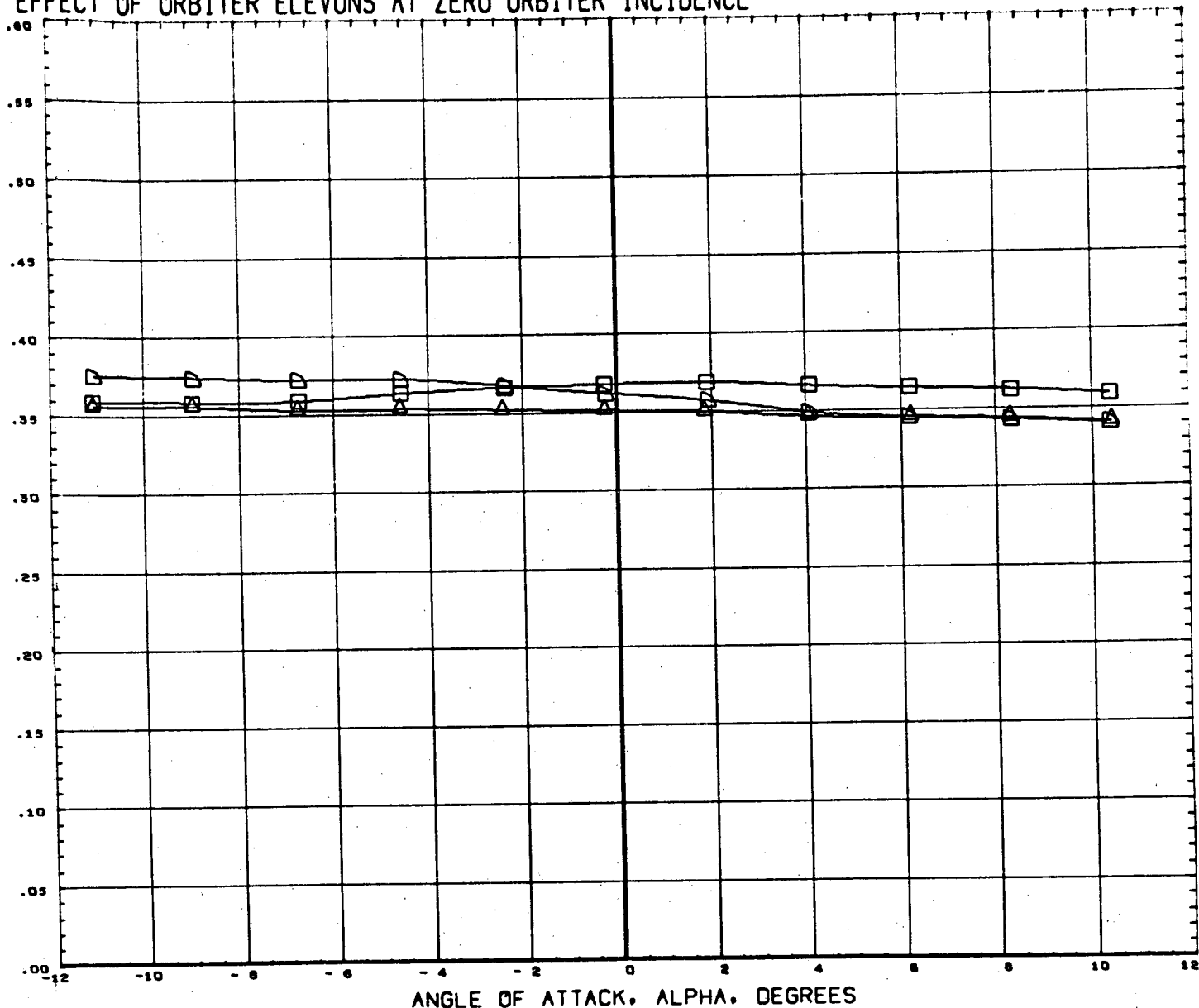
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|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

AXIAL FORCE COEFFICIENT, CA



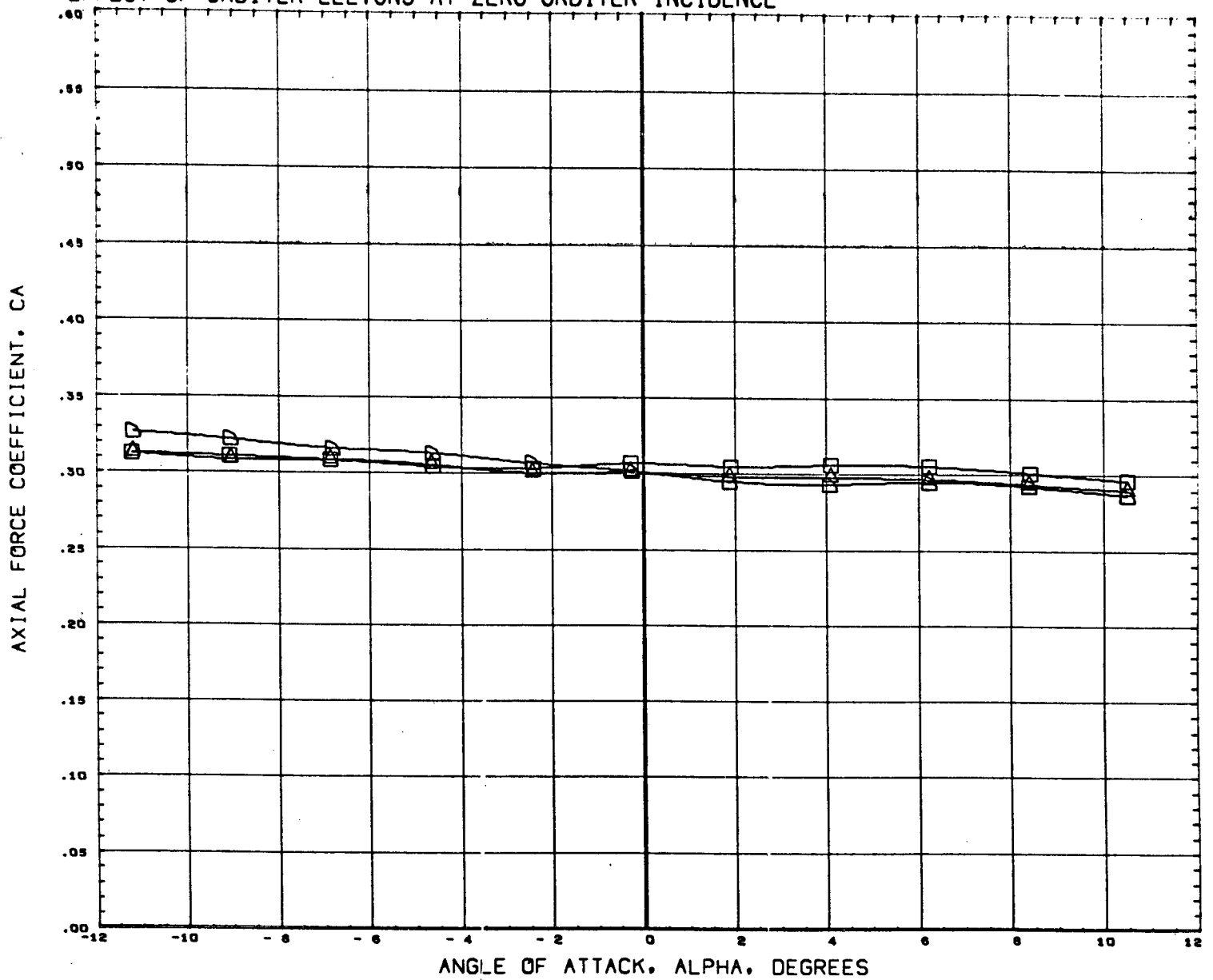
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| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (871097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | SREF 4.4600 IN. |
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XHRP 3.3600 IN. |
| (871103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YHRP 0.0000 IN. |
| (871101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP 0.2480 IN. |
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MACH

1.46

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

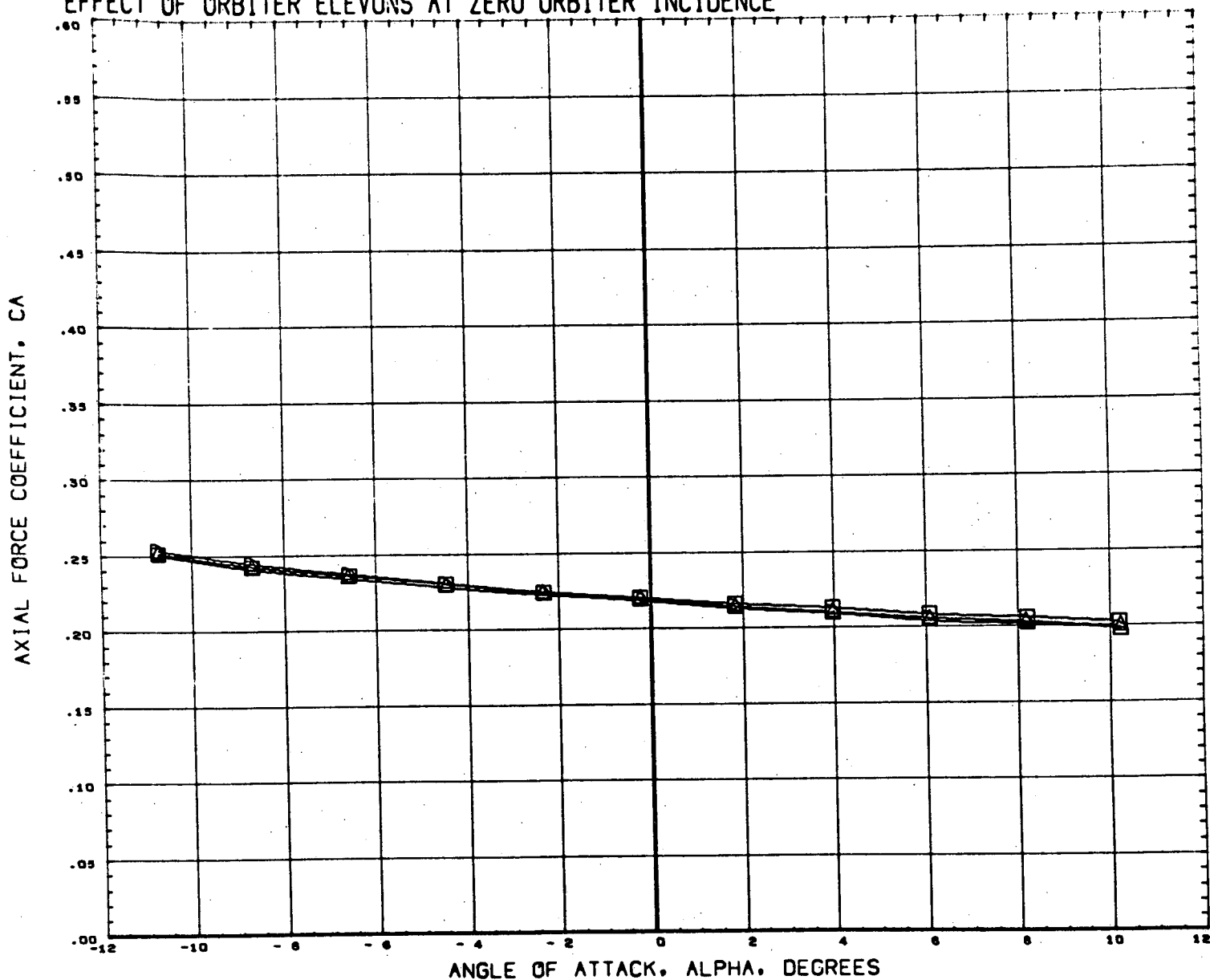


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| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.95

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



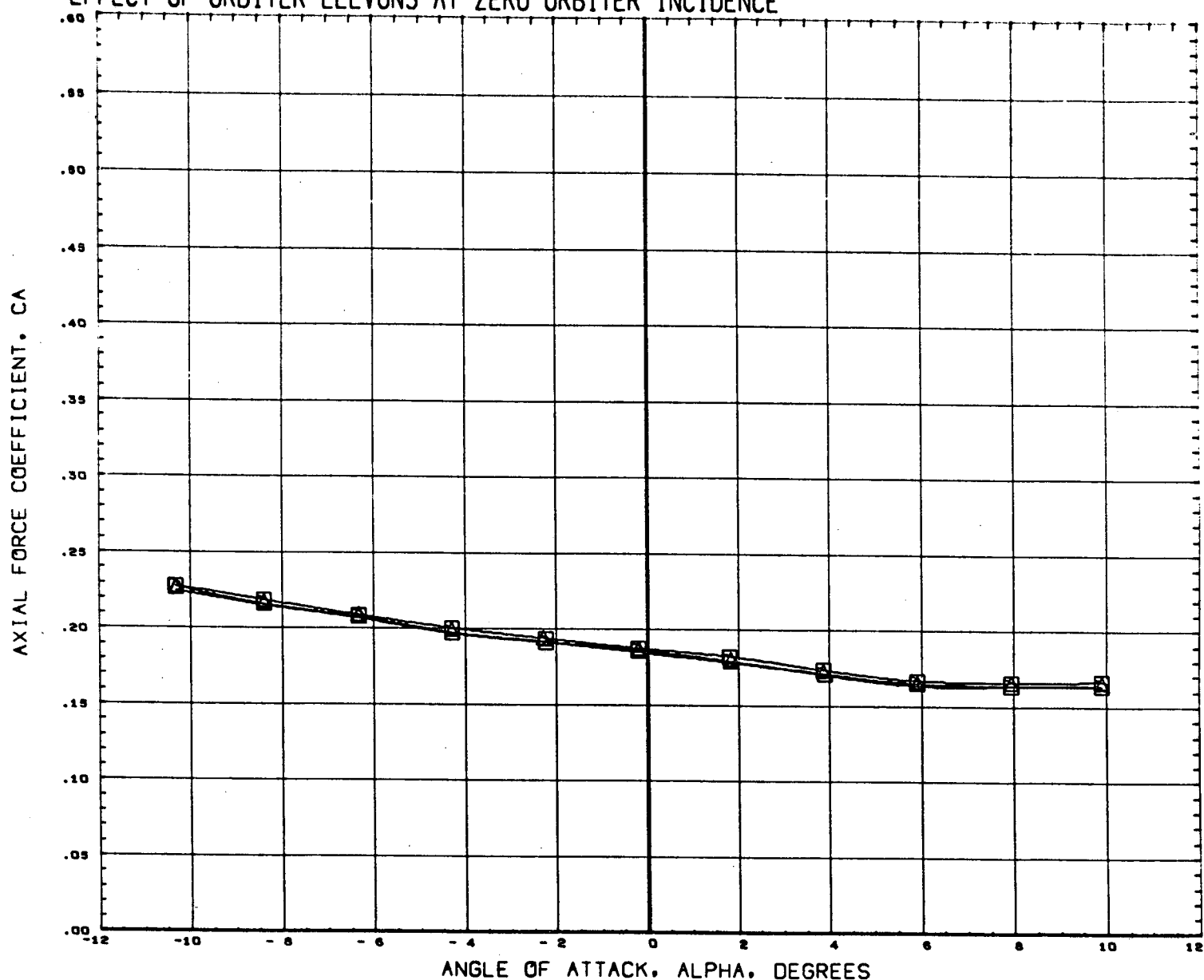
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| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
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MACH

3.48

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



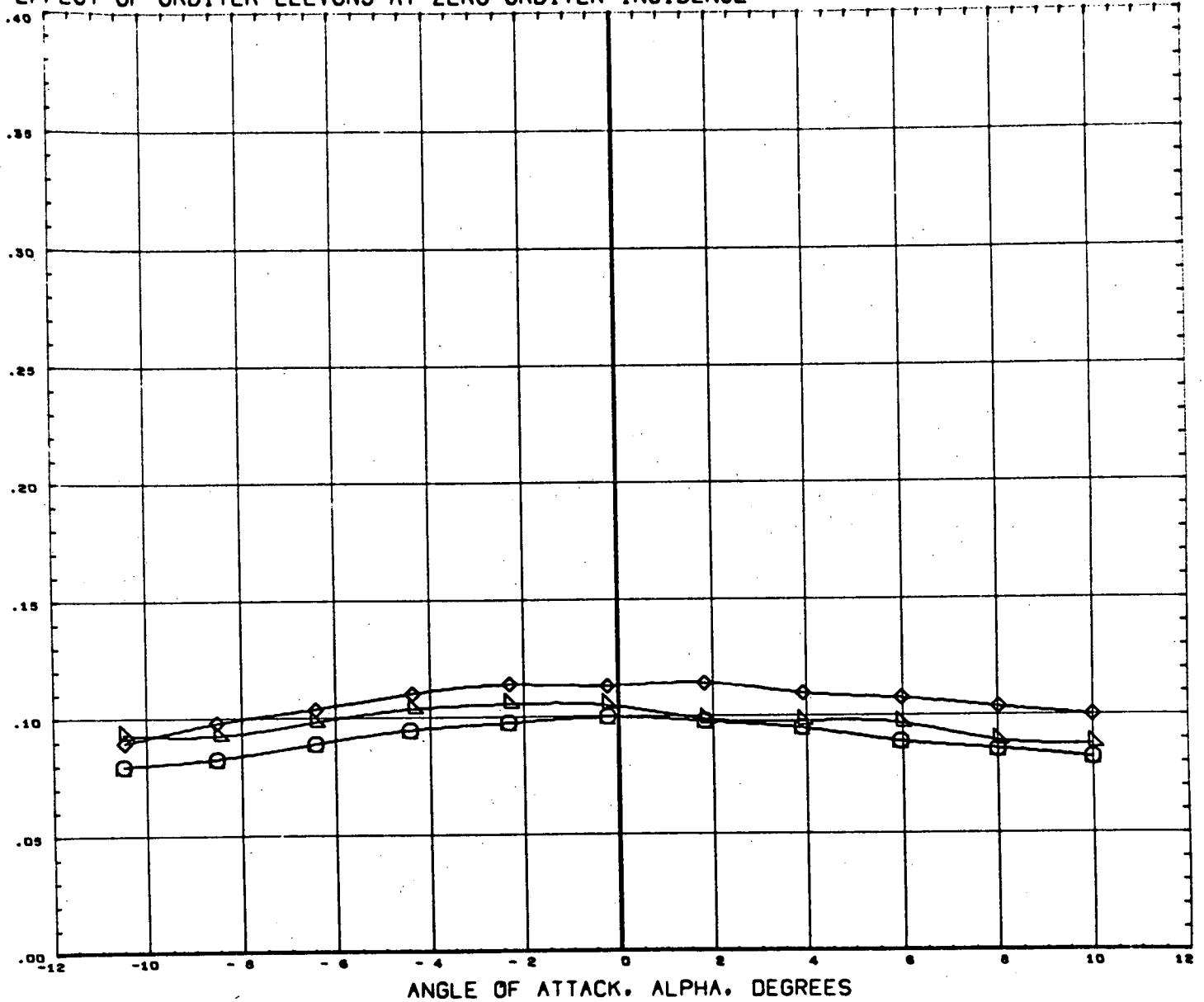
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| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



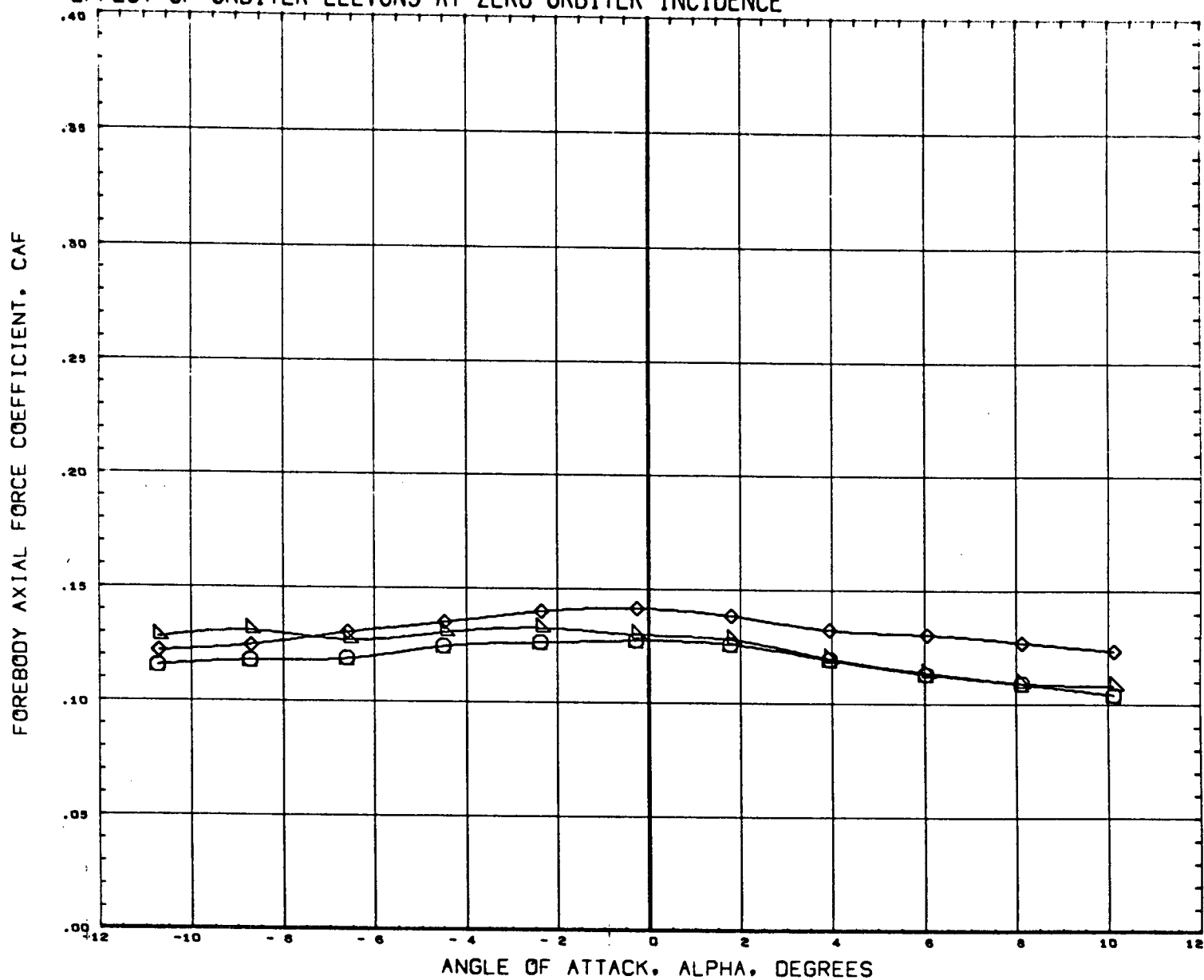
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| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP 0.2480 IN. |
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MACH

.60

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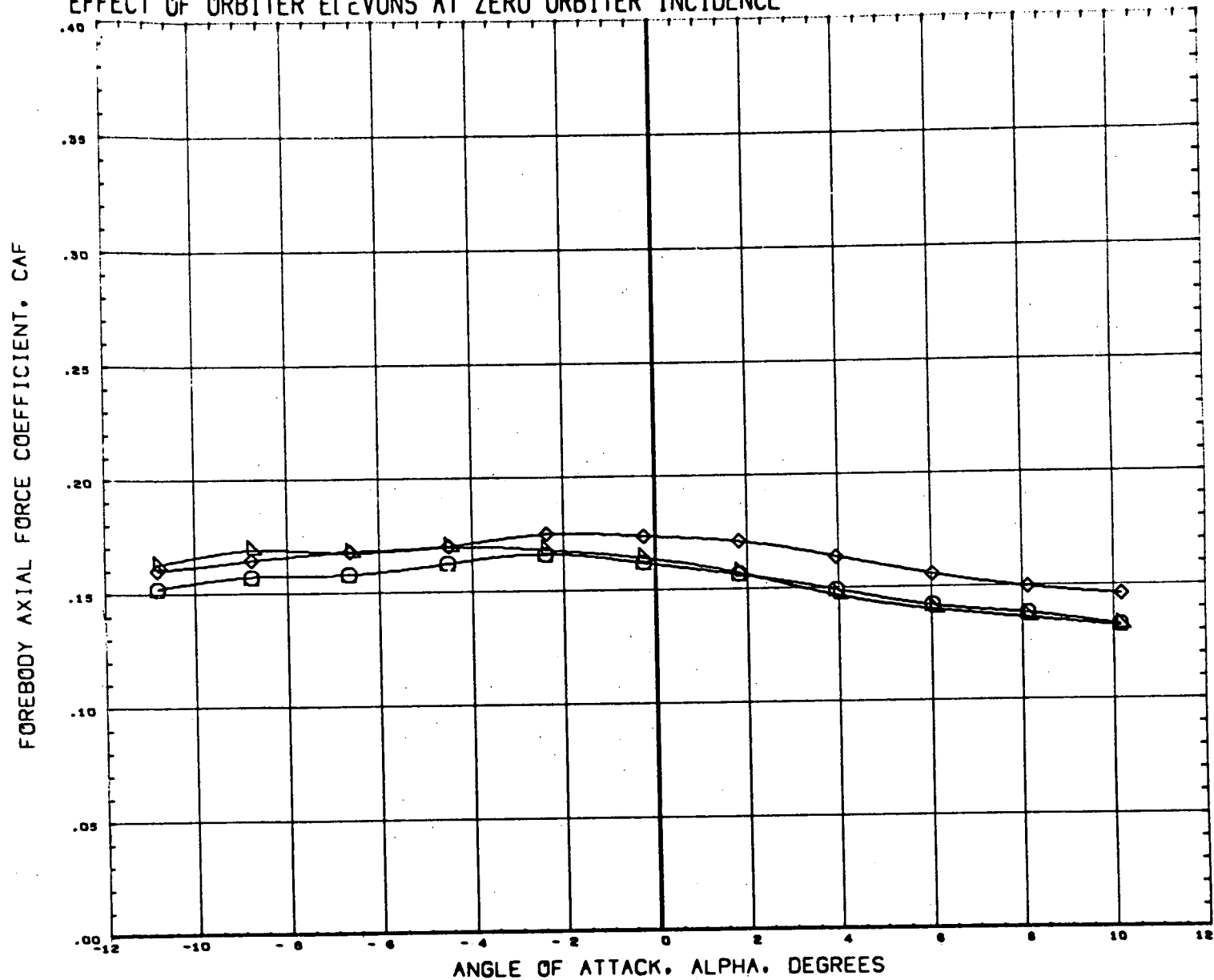
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



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| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 | IN. |
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MACH .80

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

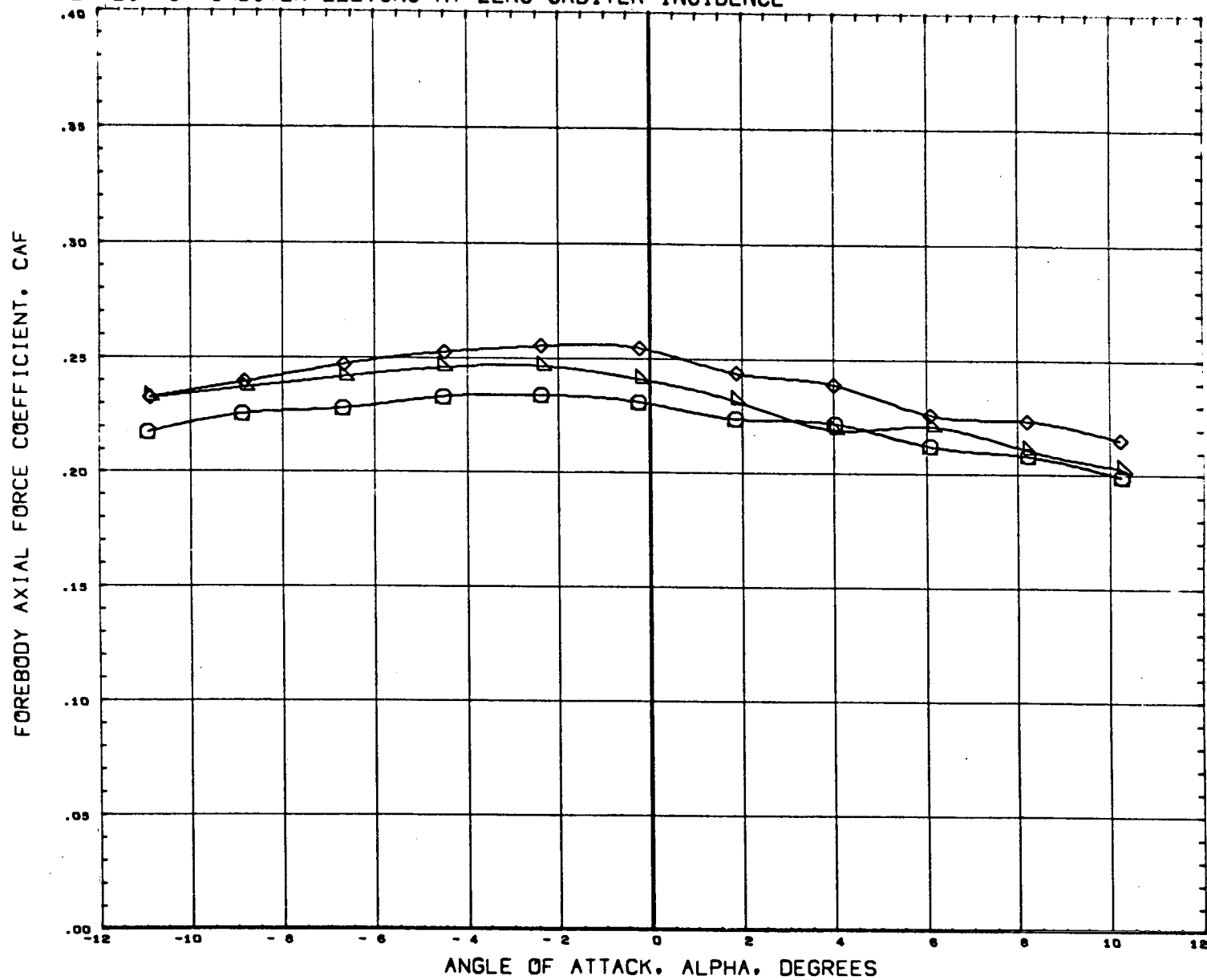


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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | SREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH .90

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



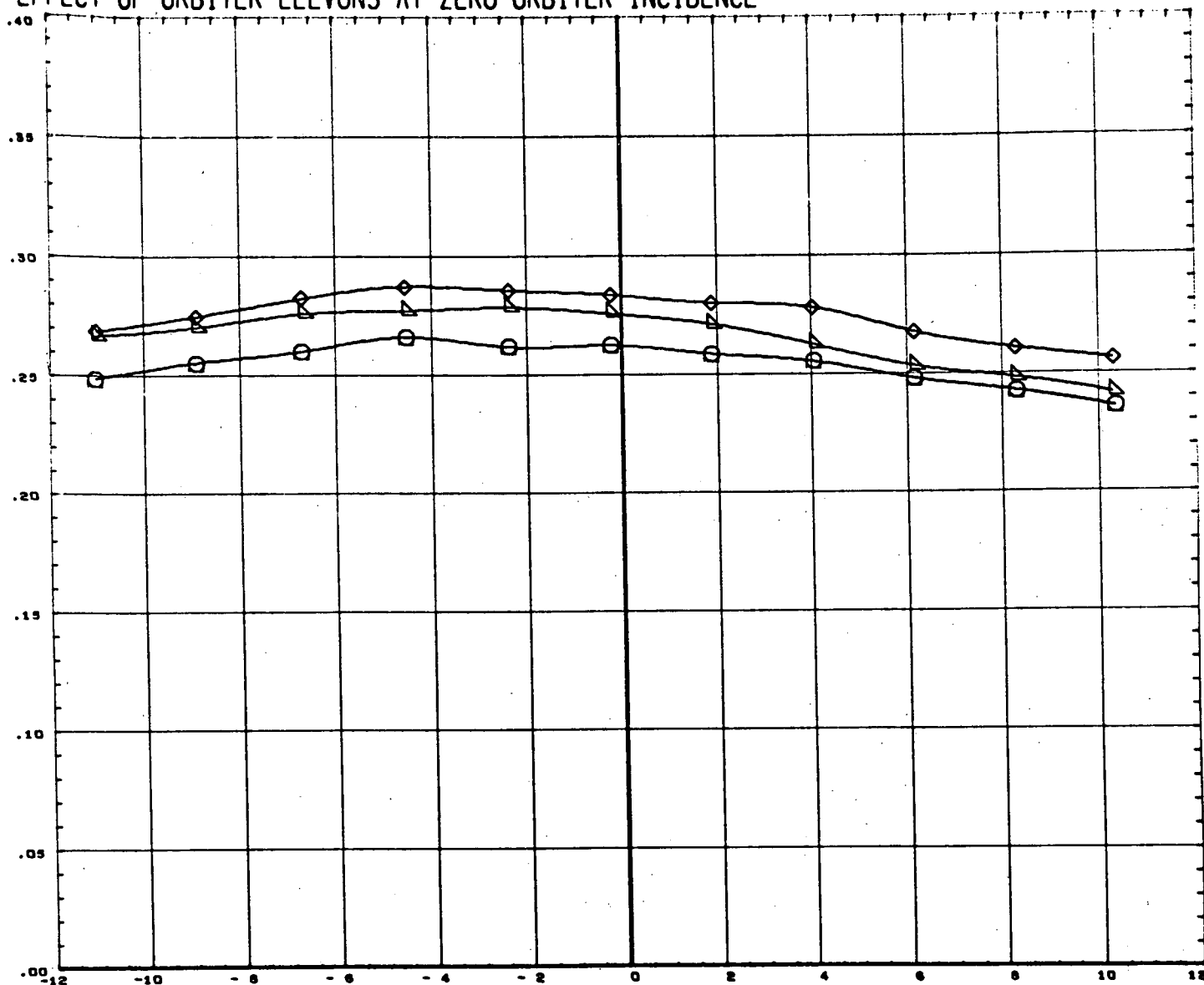
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| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
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| | | | | | | SCALE | 0.0040 SCALE |

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



ANGLE OF ATTACK, ALPHA, DEGREES

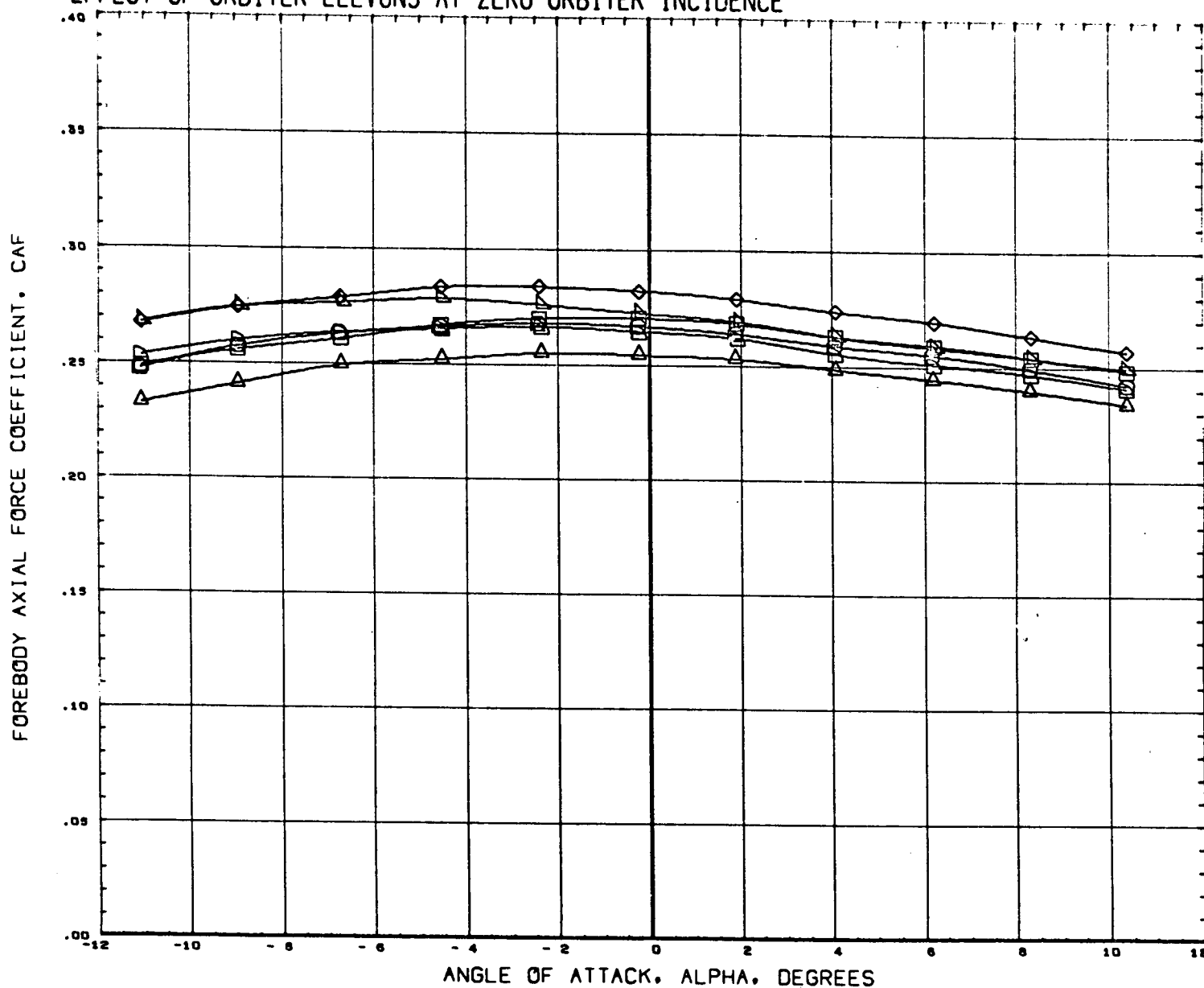
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| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | 1N. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | 1N. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | 1N. |
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| | | | | | | SCALE | 0.0040 | SCALE |

MACH

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
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| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
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| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
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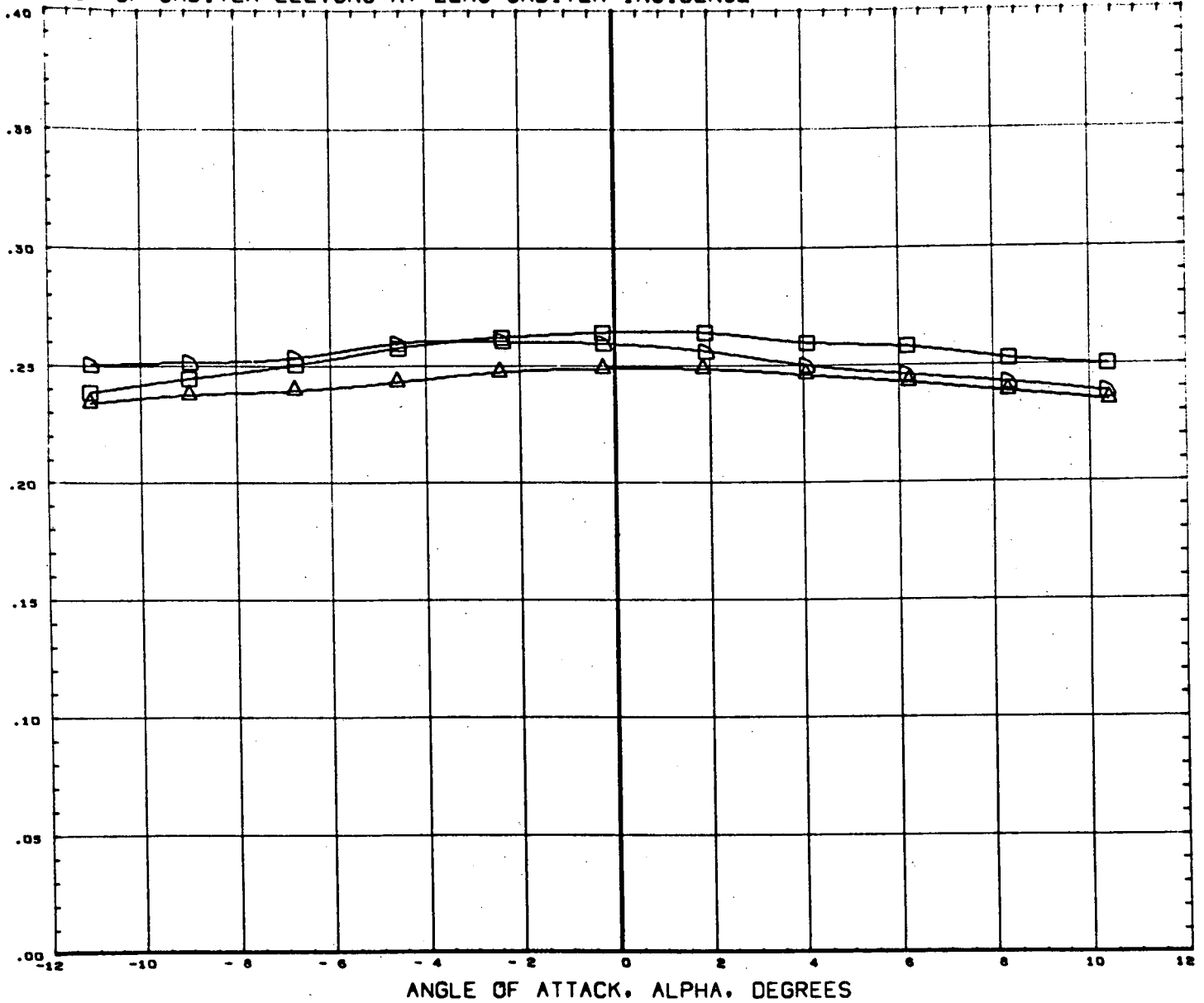
MACH

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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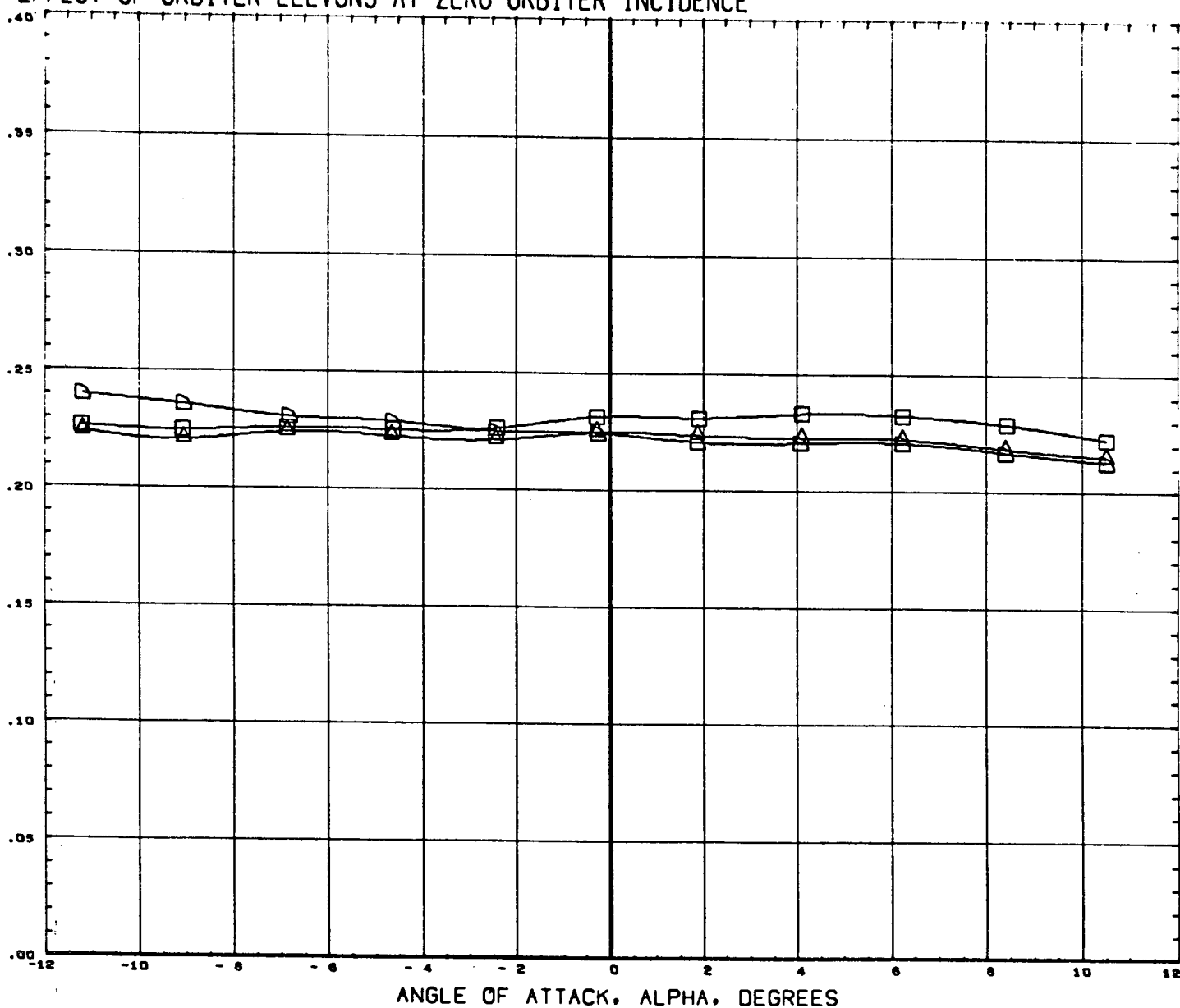
MACH

1.46

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

FOREBODY AXIAL FORCE COEFFICIENT, CAF

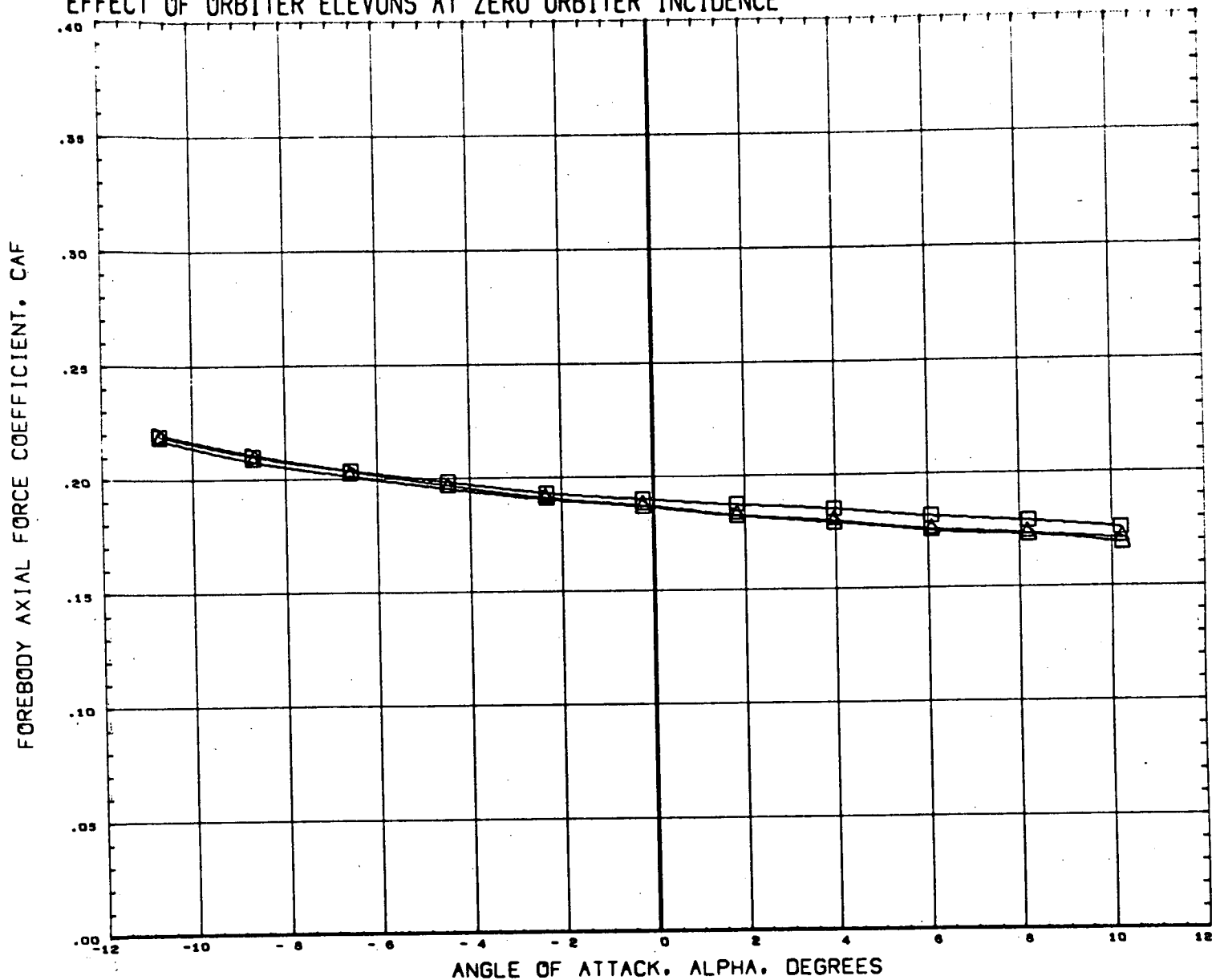


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| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 944X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 944X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
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MACH 1.95

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

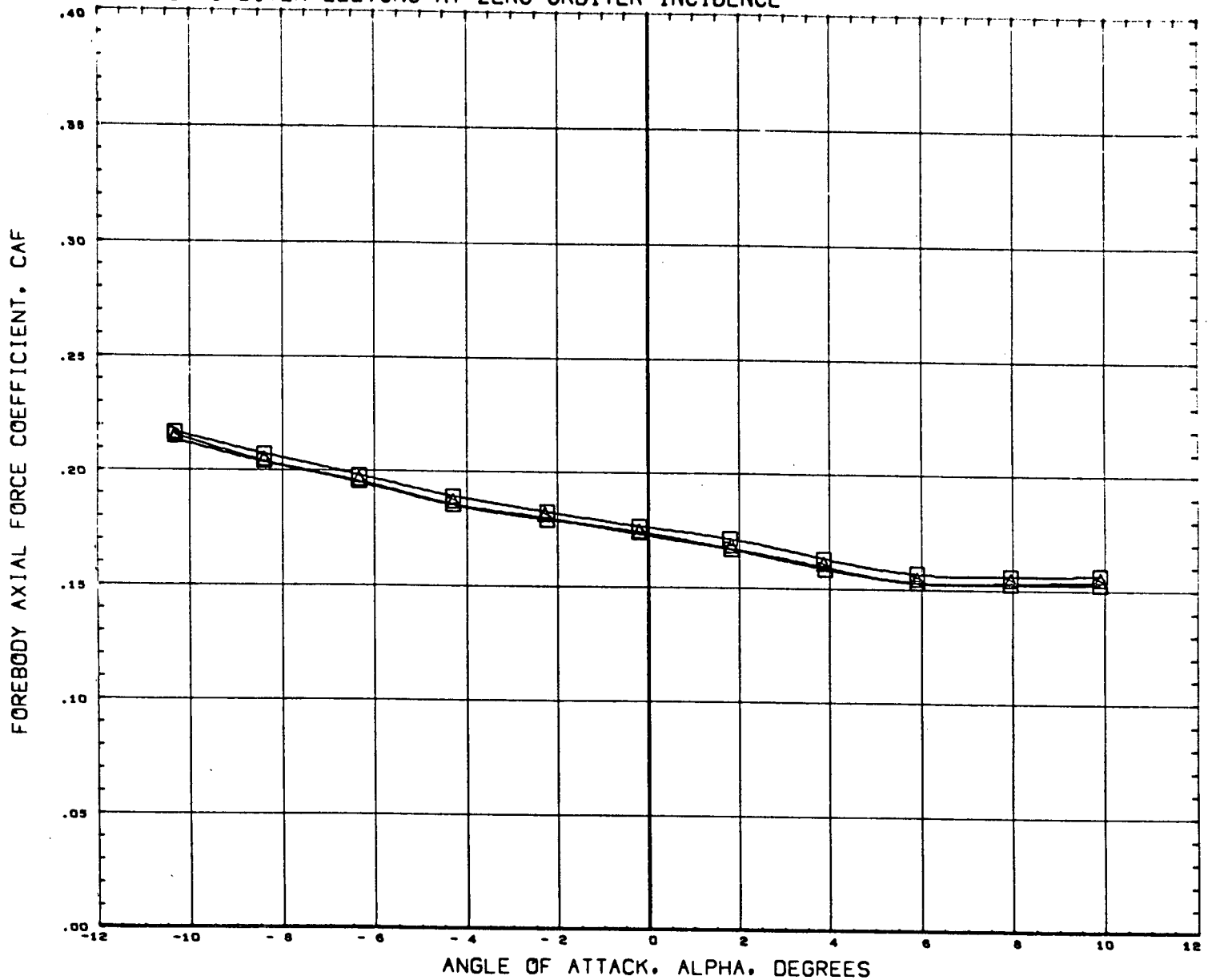


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH 3.48

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

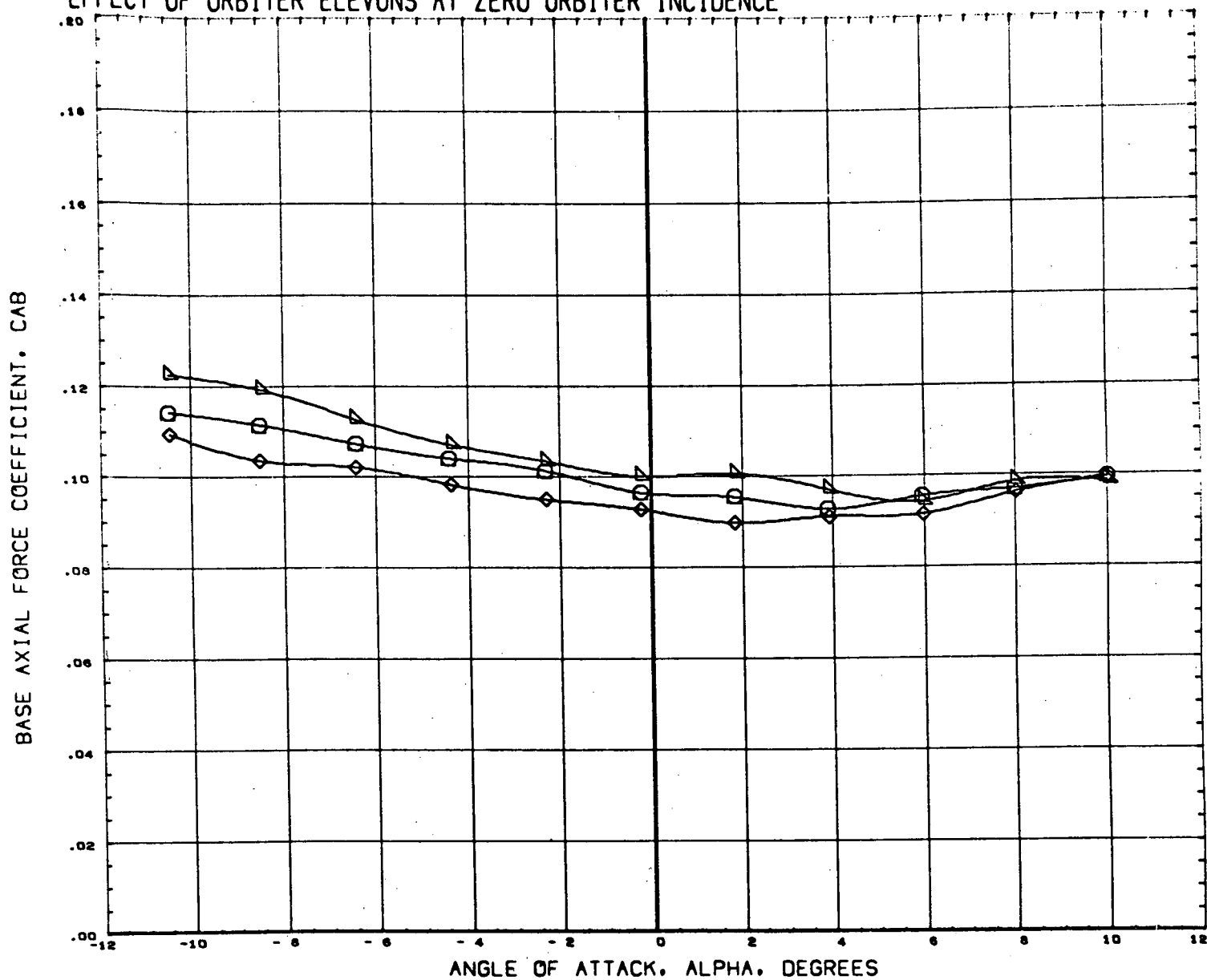


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
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| (871101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH 4.96

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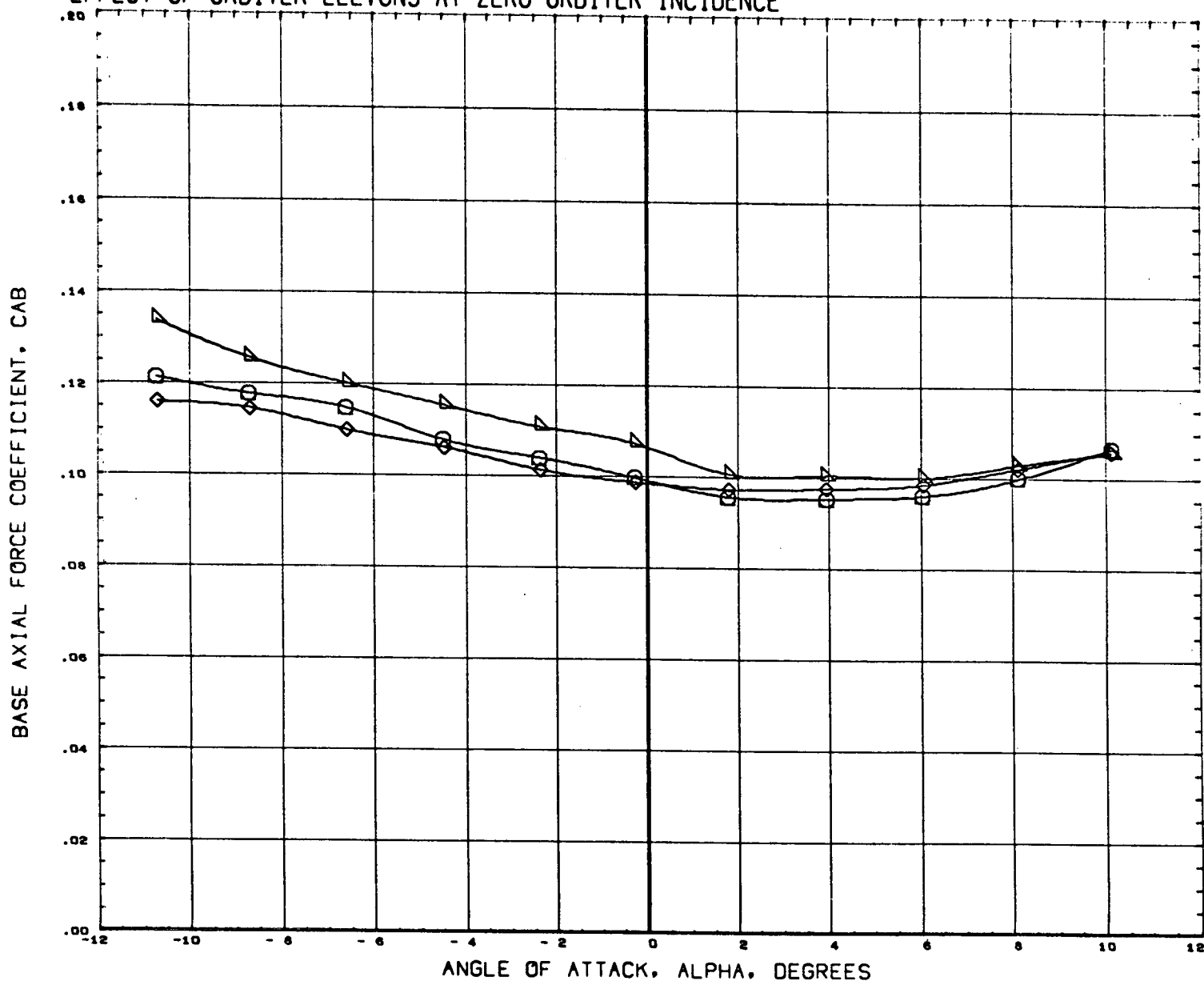
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



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| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH .60

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

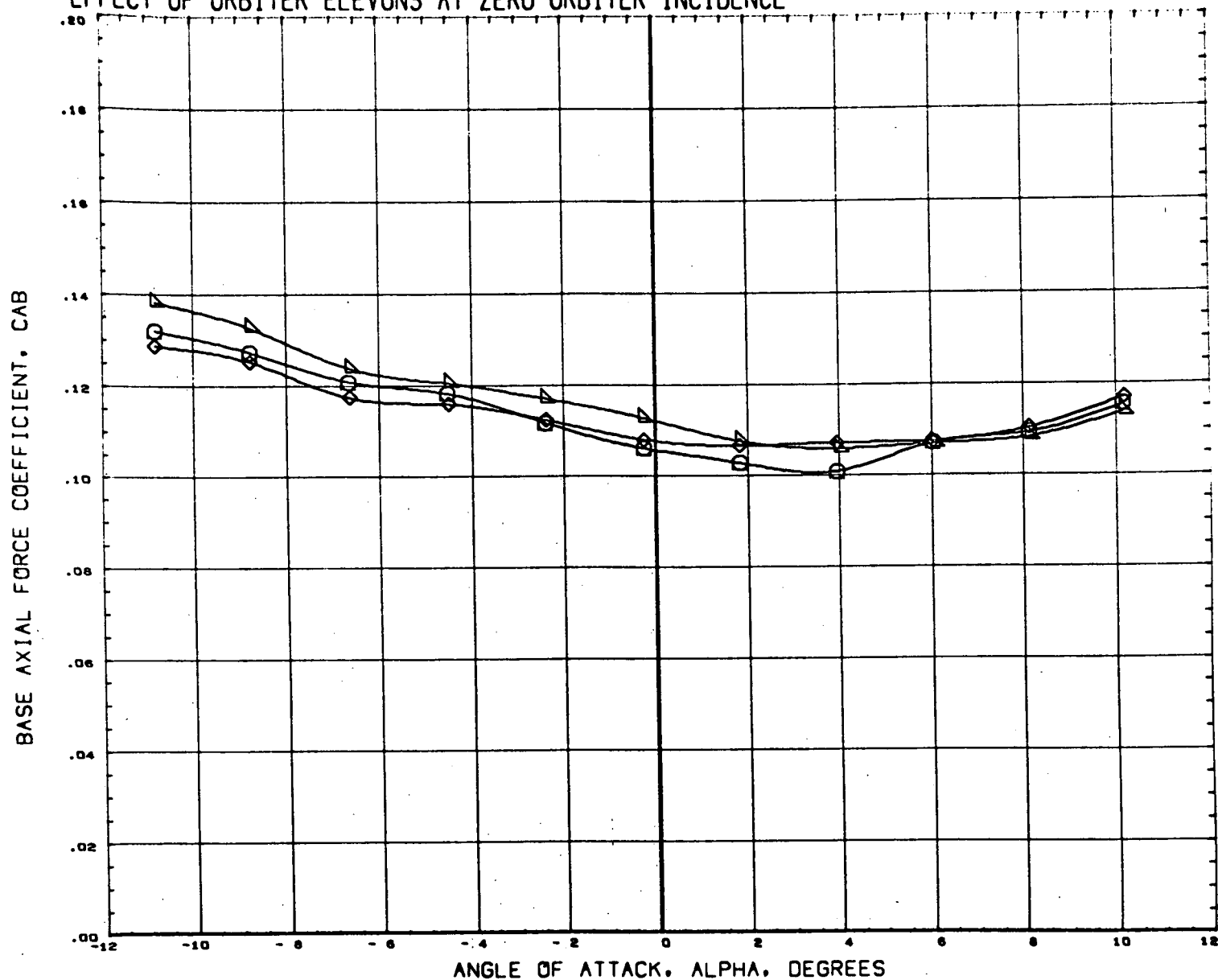


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|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

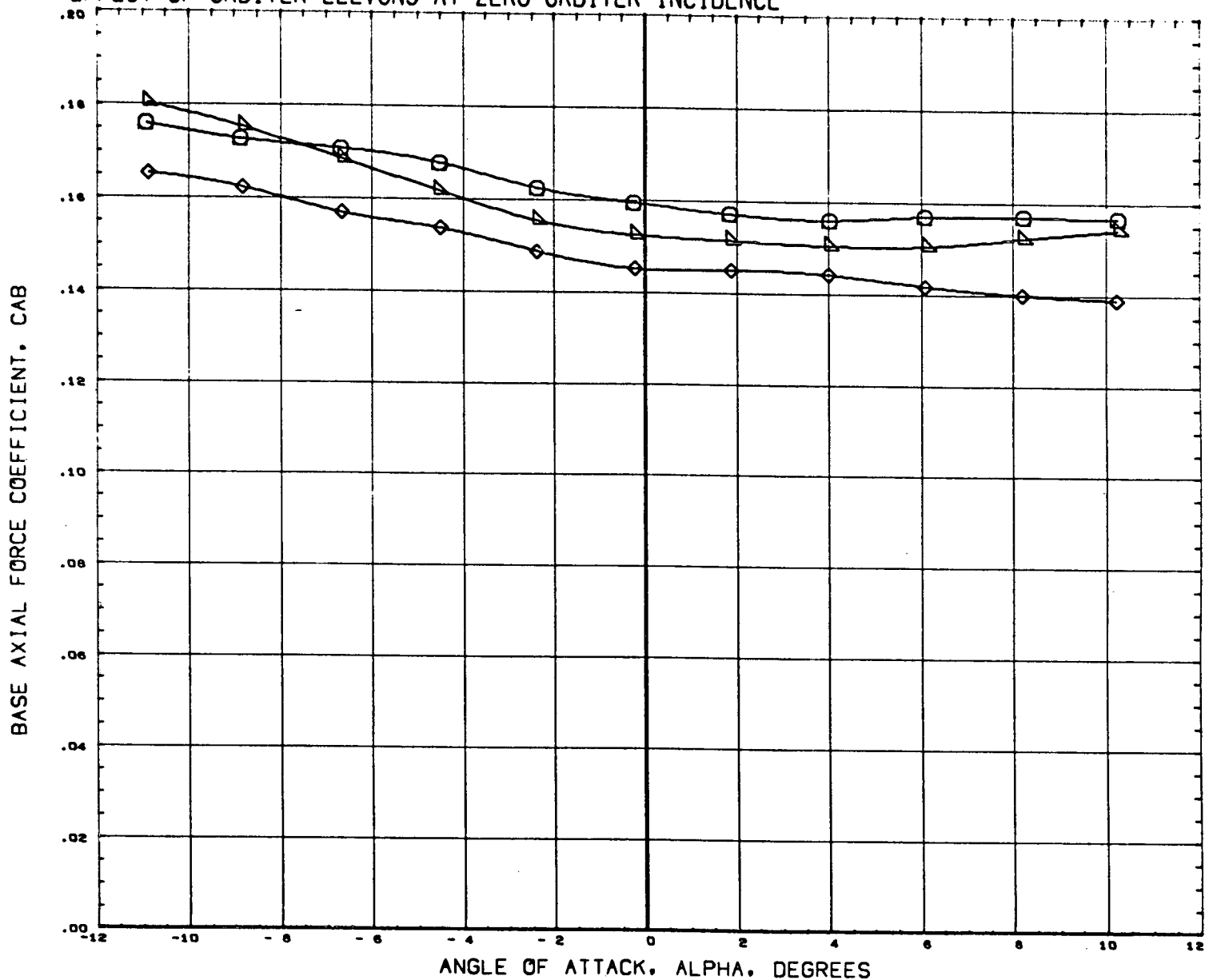


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
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MACH .90

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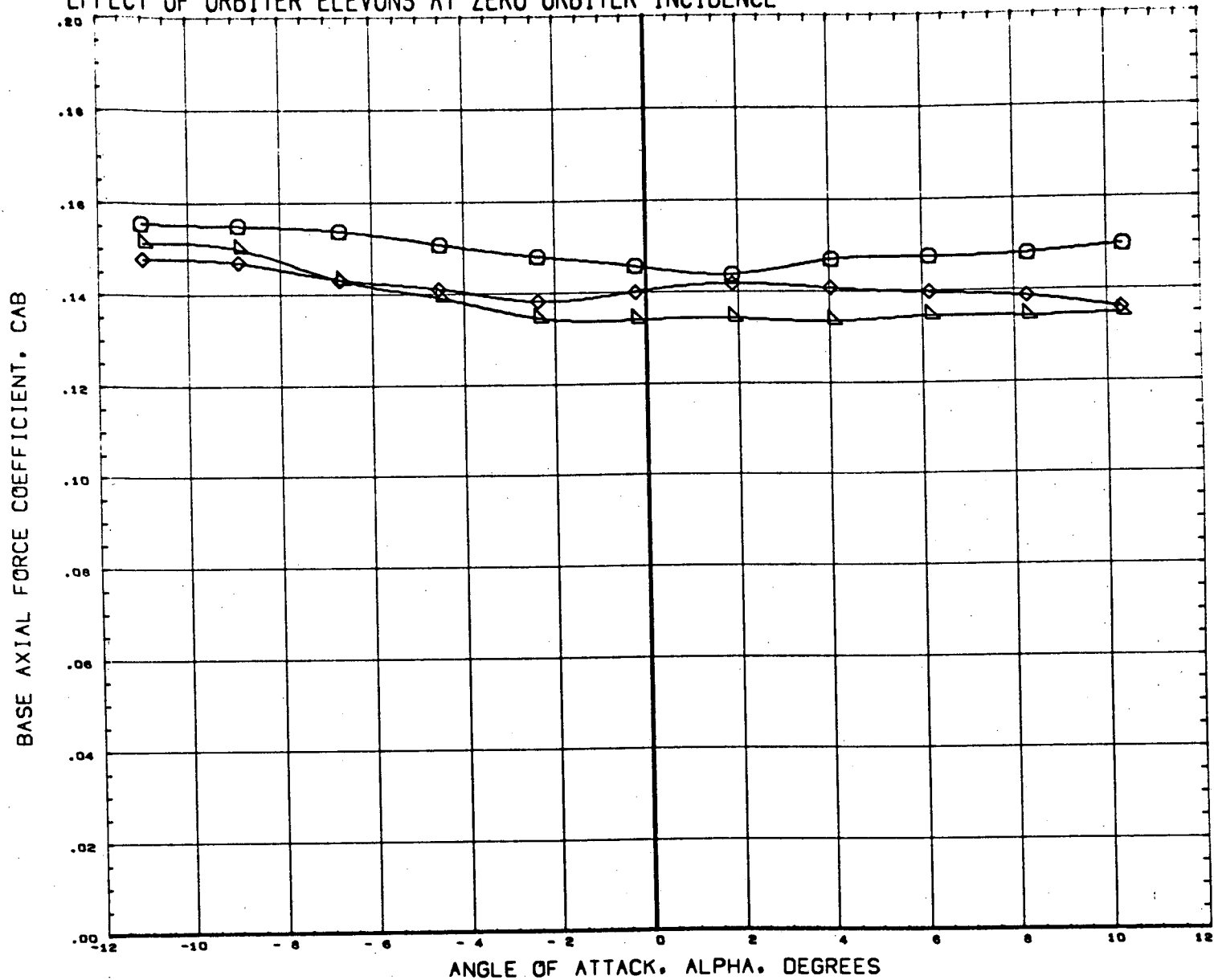
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



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| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
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| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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MACH 1.00

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



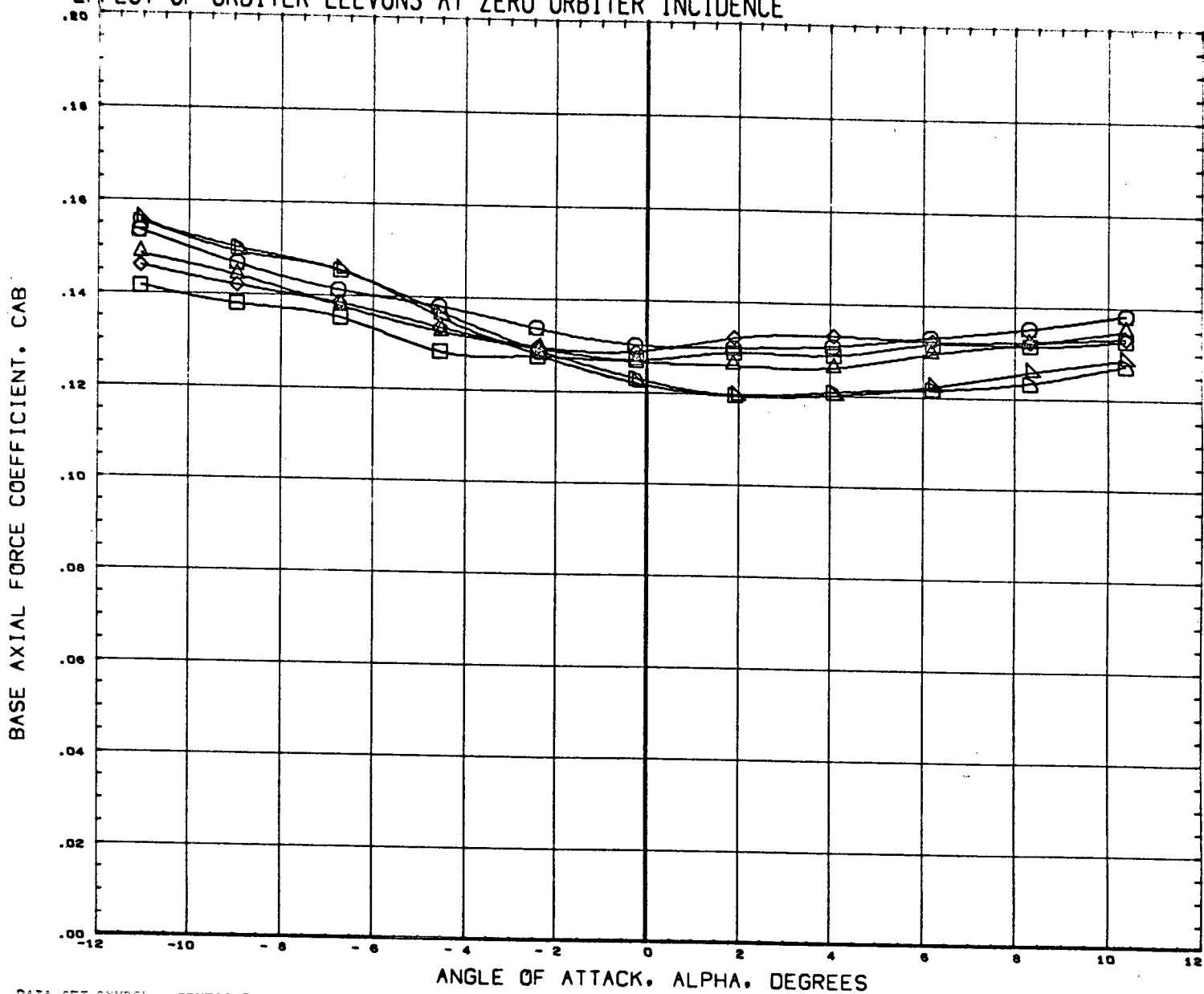
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| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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MACH

1.10

PAGE 327

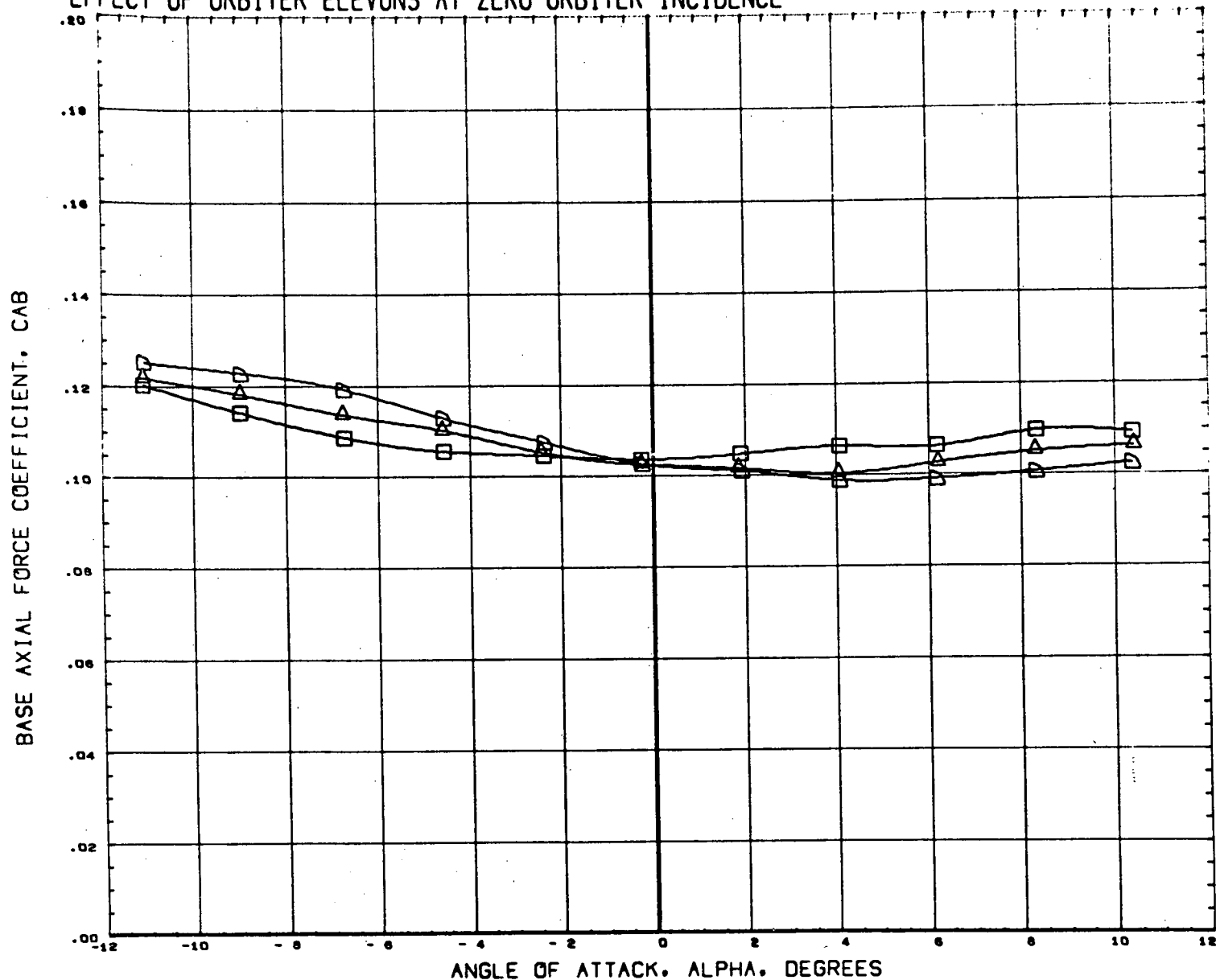
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



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MACH 1.20

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
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| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
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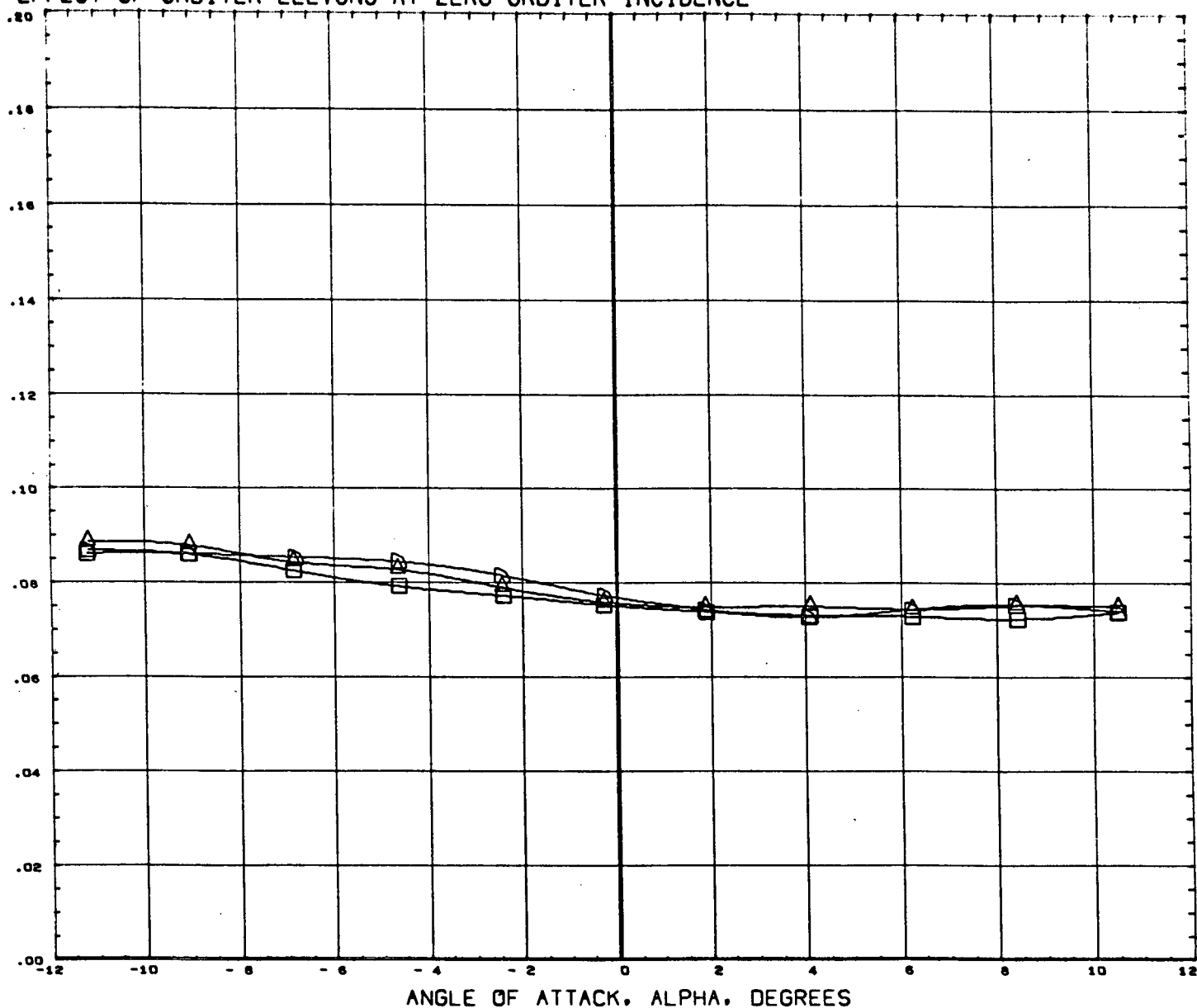
MACH

1.46

PAGE 329

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

BASE AXIAL FORCE COEFFICIENT, CAB



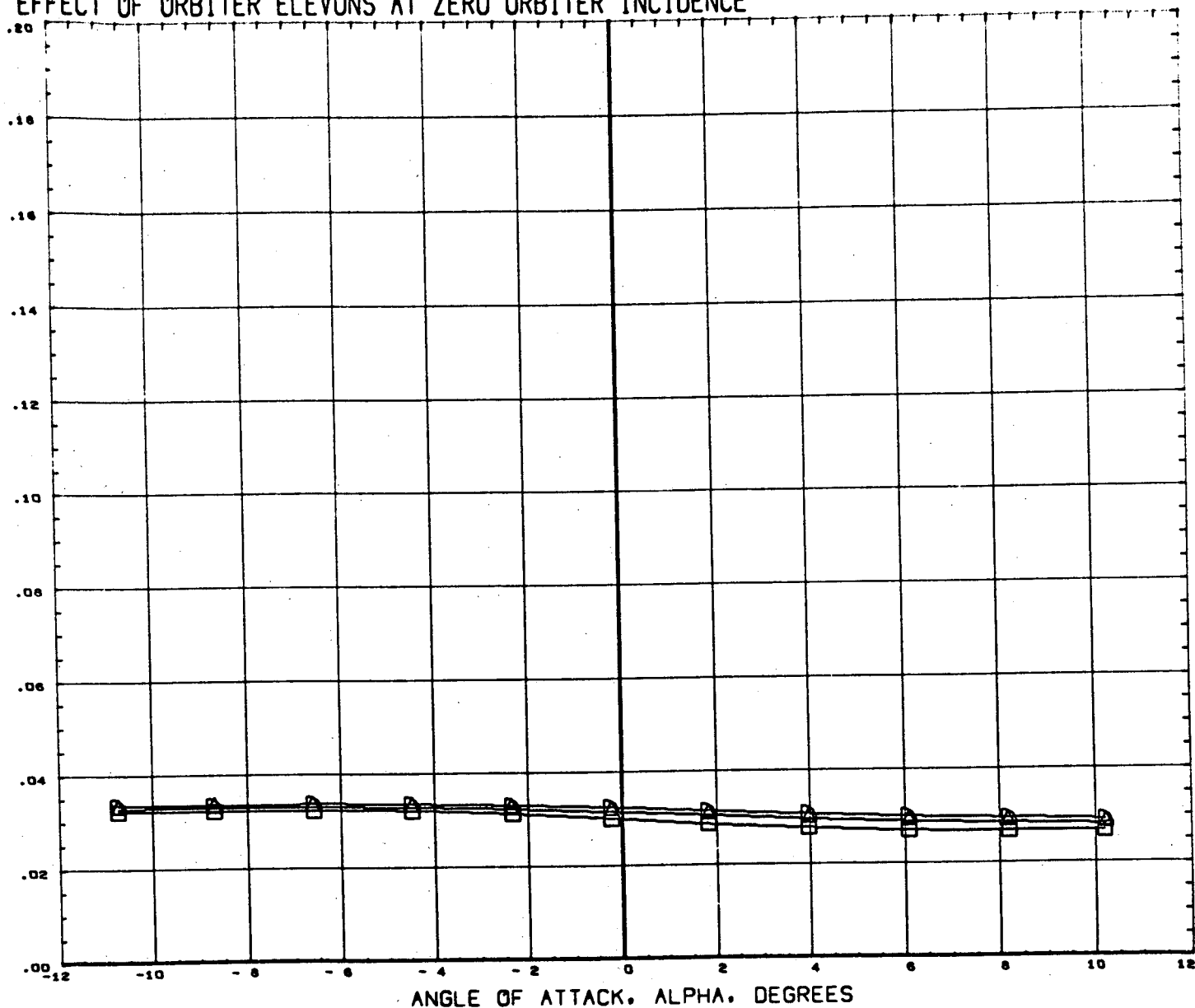
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| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

PAGE 330

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

BASE AXIAL FORCE COEFFICIENT, CAB



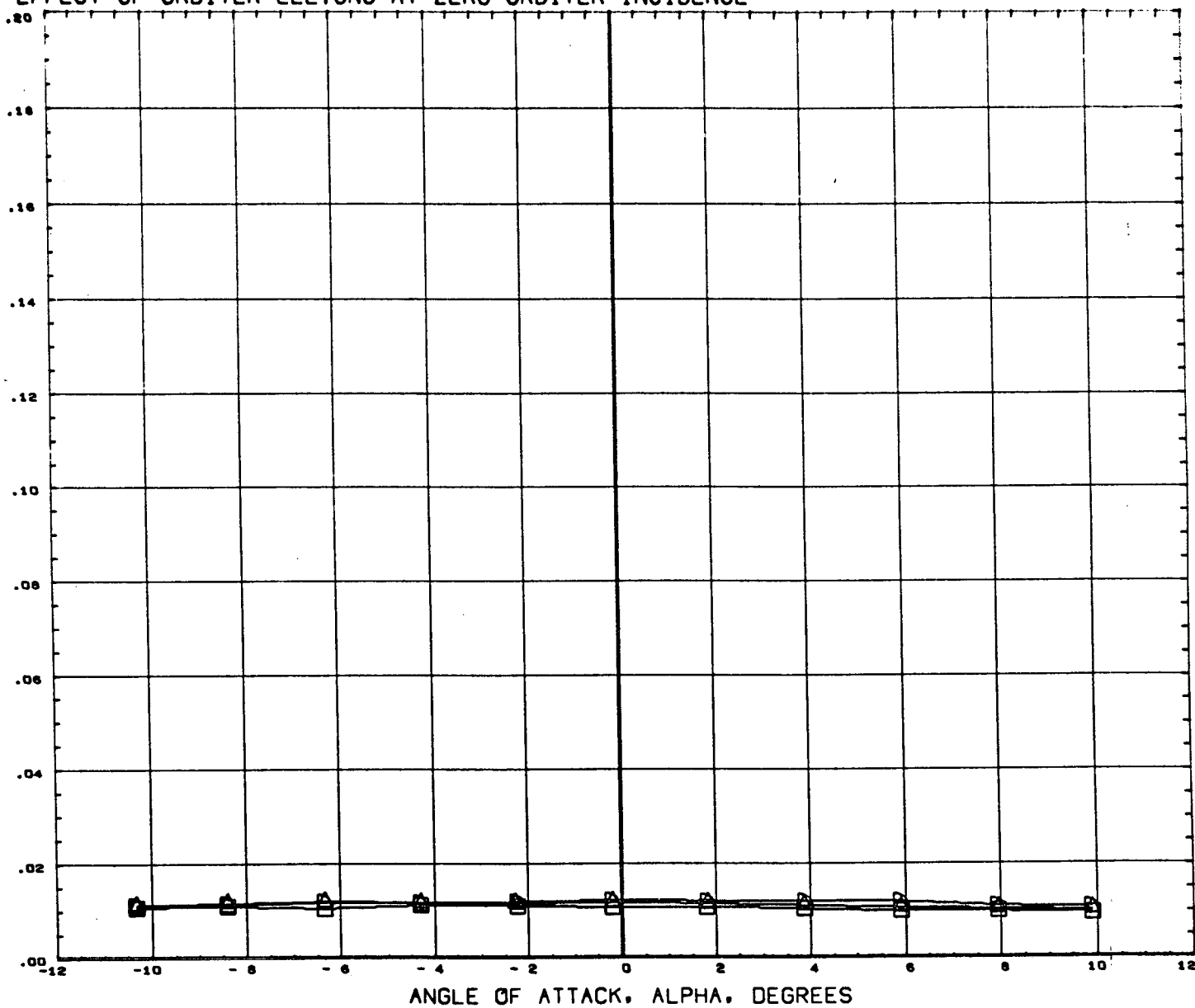
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| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

PAGE 331

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

BASE AXIAL FORCE COEFFICIENT, CAB



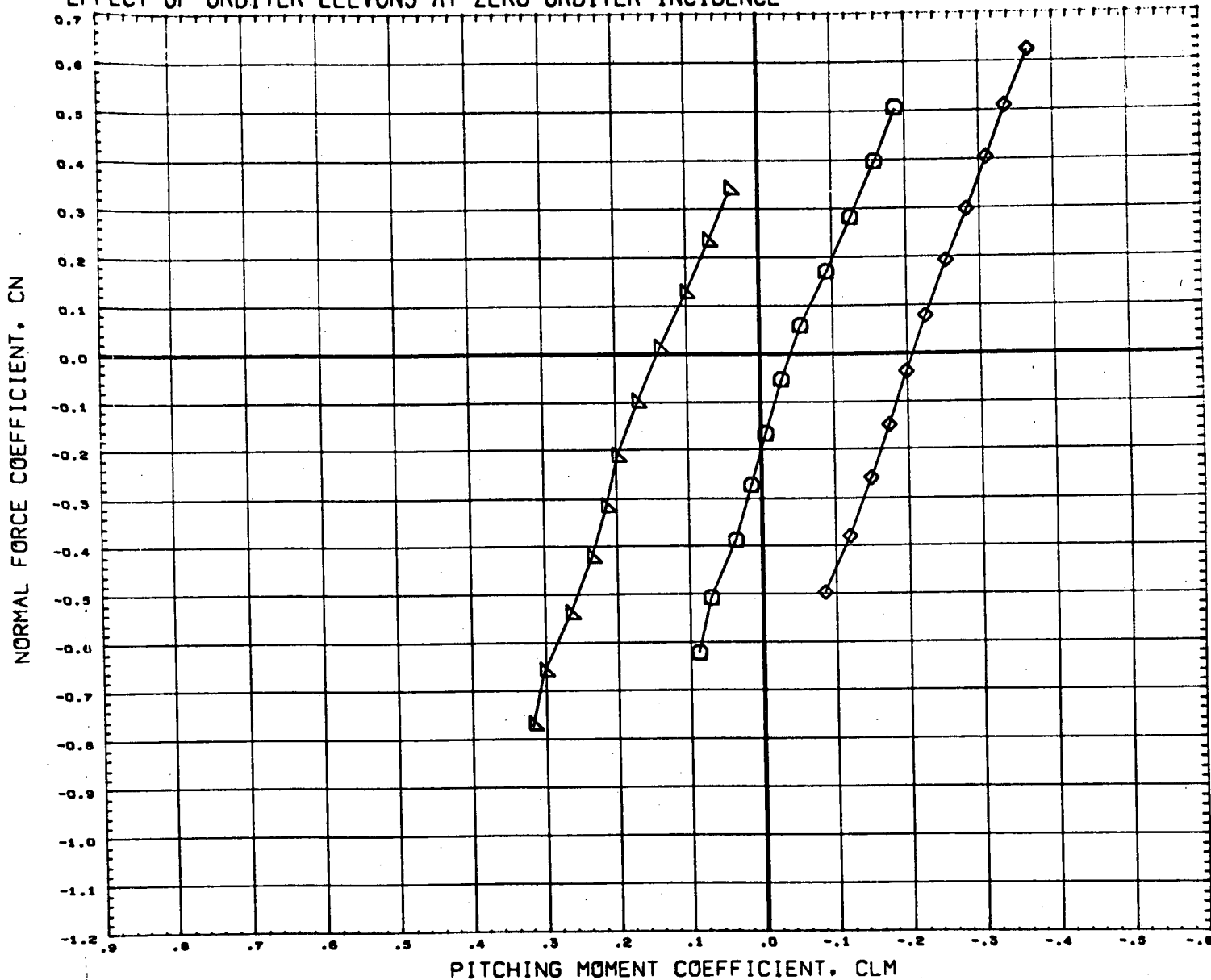
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MACH

4.96

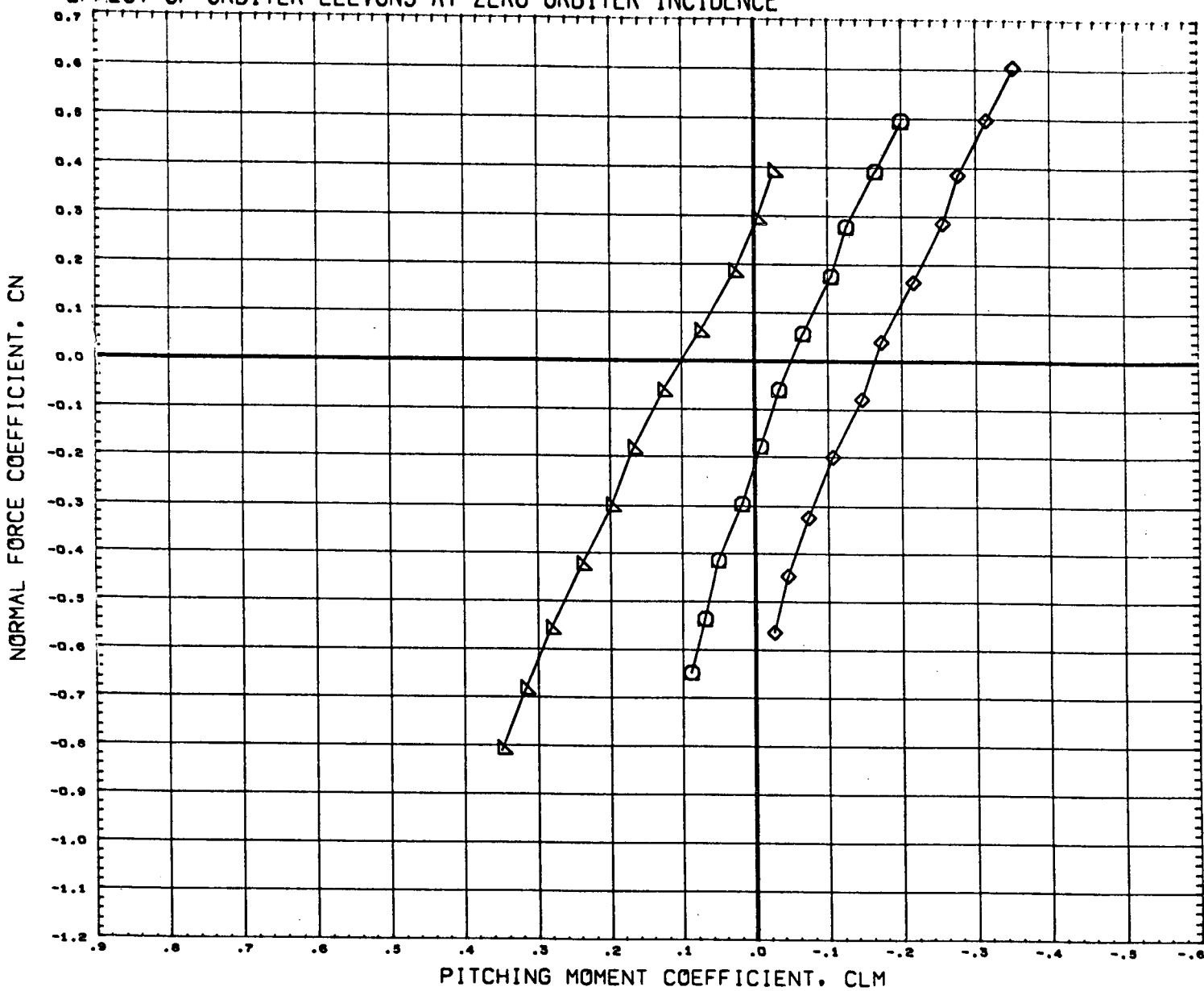
PAGE 332

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
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| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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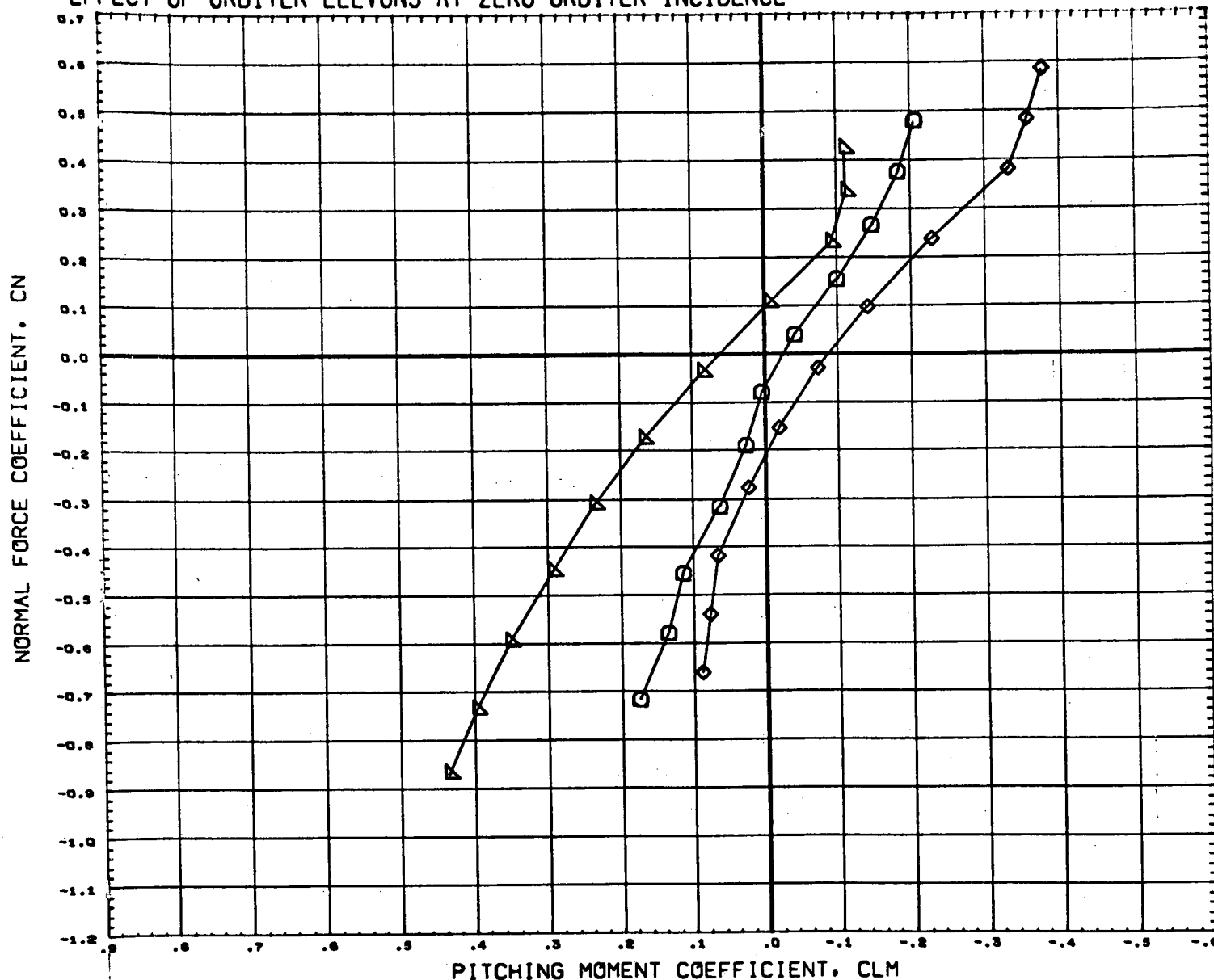
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



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| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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MACH .80

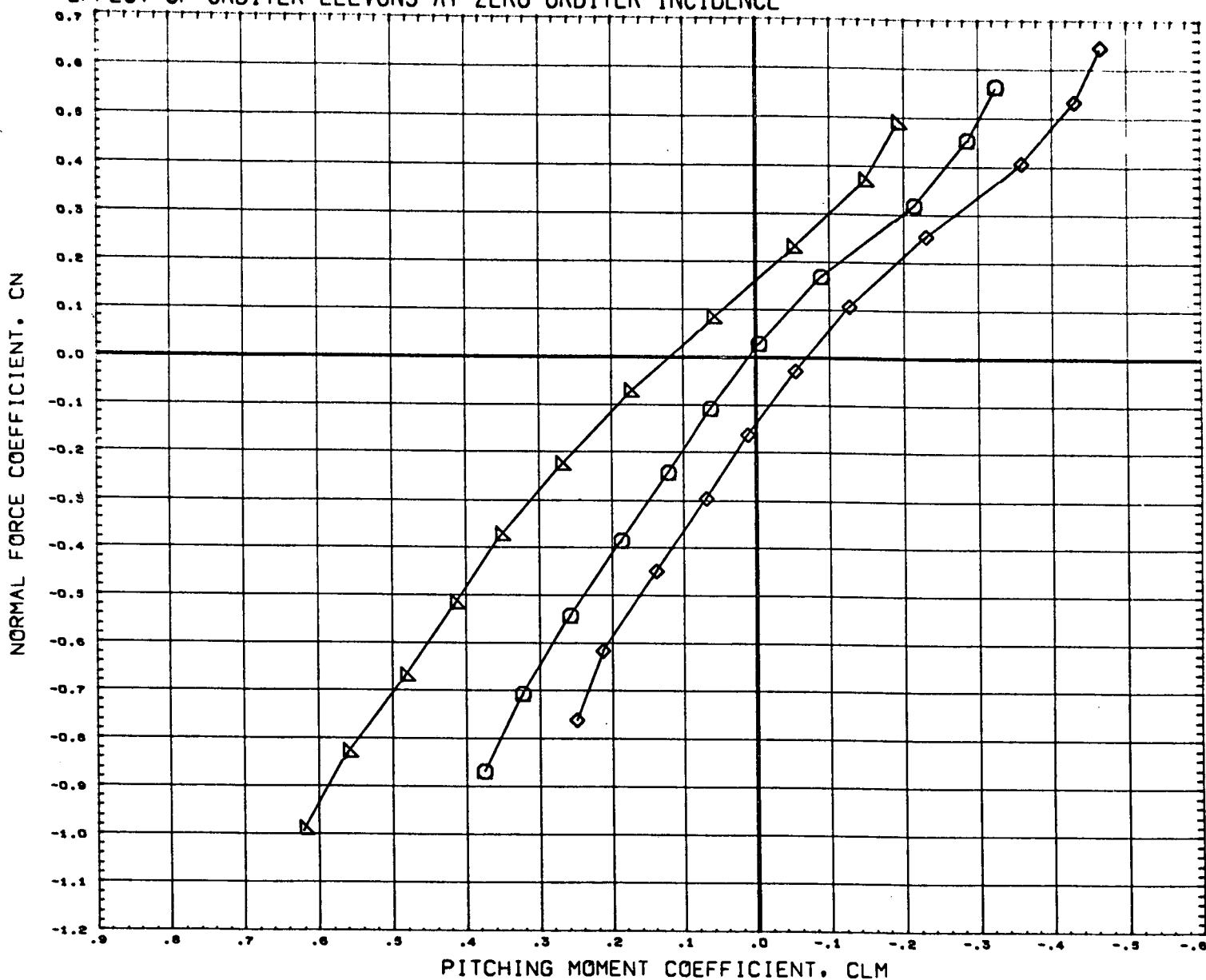
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



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| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
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MACH .90

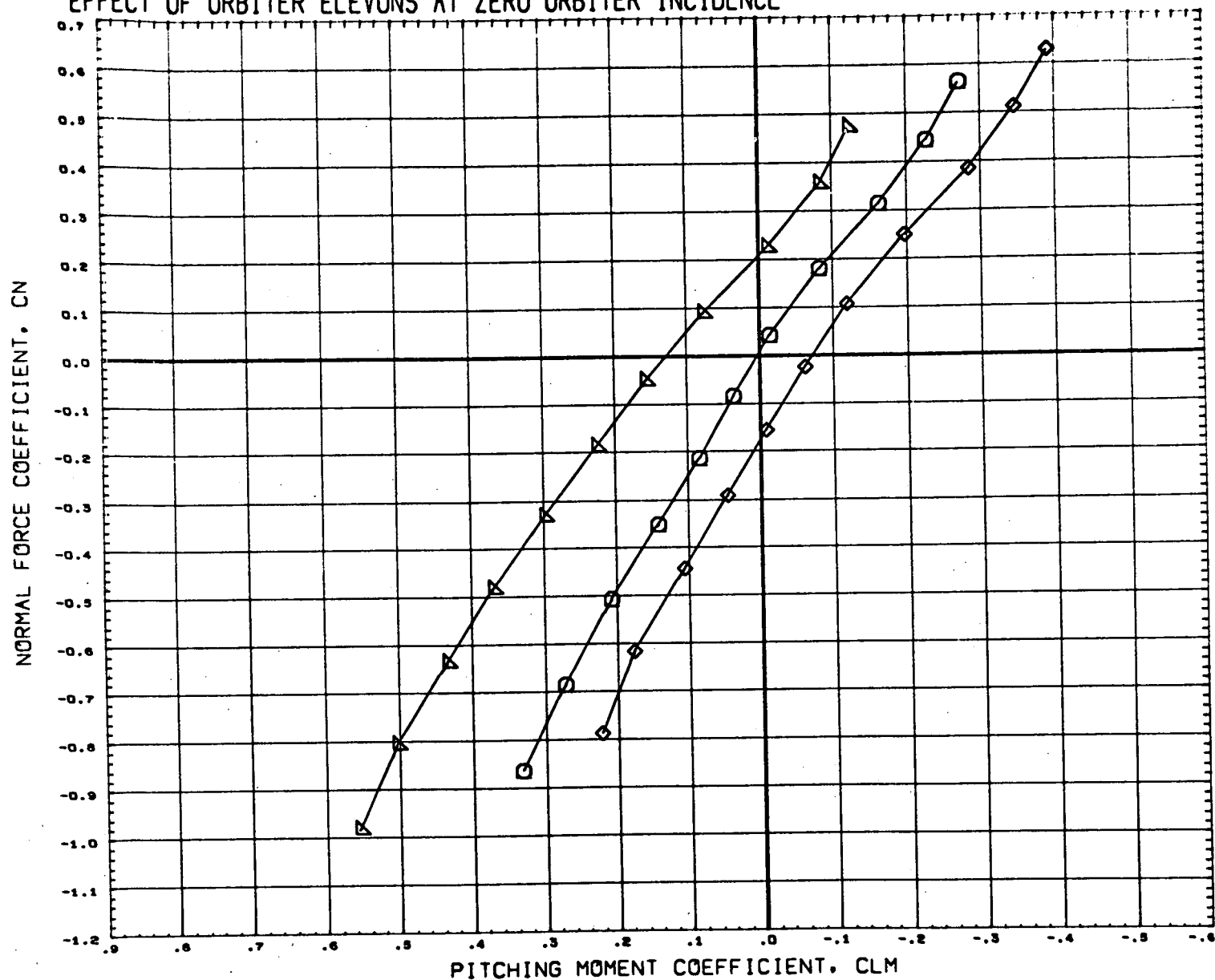
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 IN. |
| (871103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 IN. |
| (871101) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF | 0.2460 IN. |
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MACH 1.00

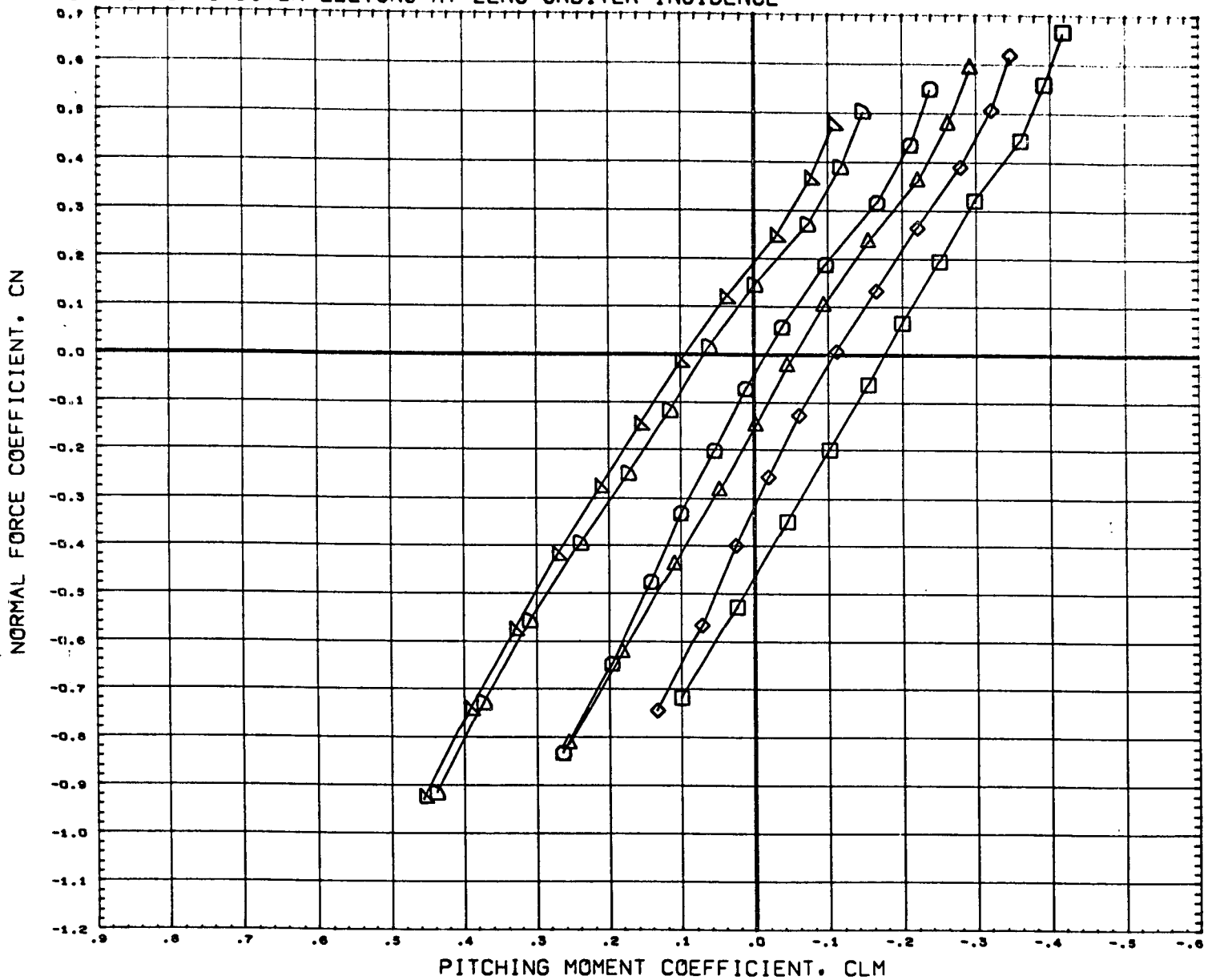
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
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| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMHP | 0.0000 IN. |
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MACH 1.10

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

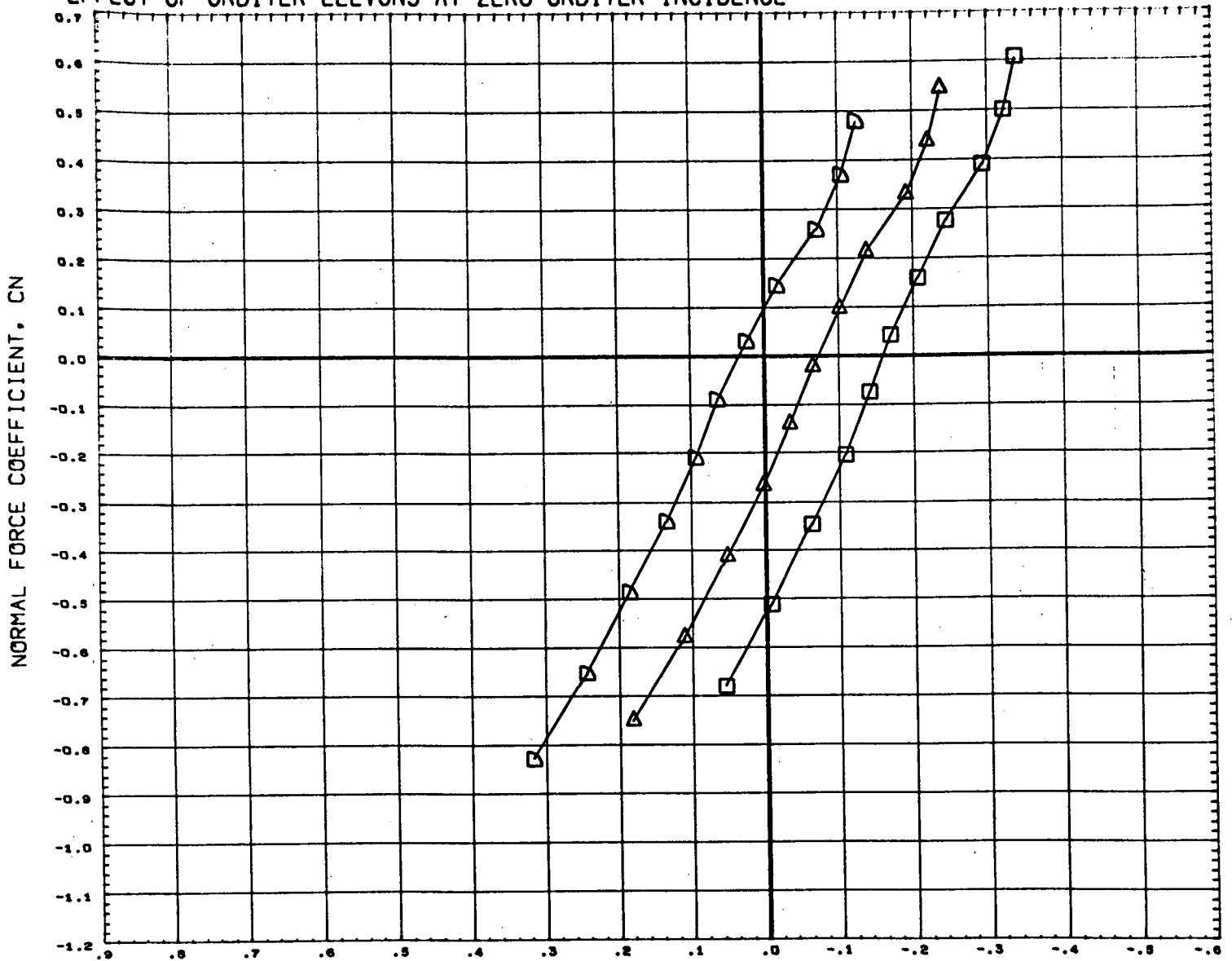


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| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
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MACH 1.20

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



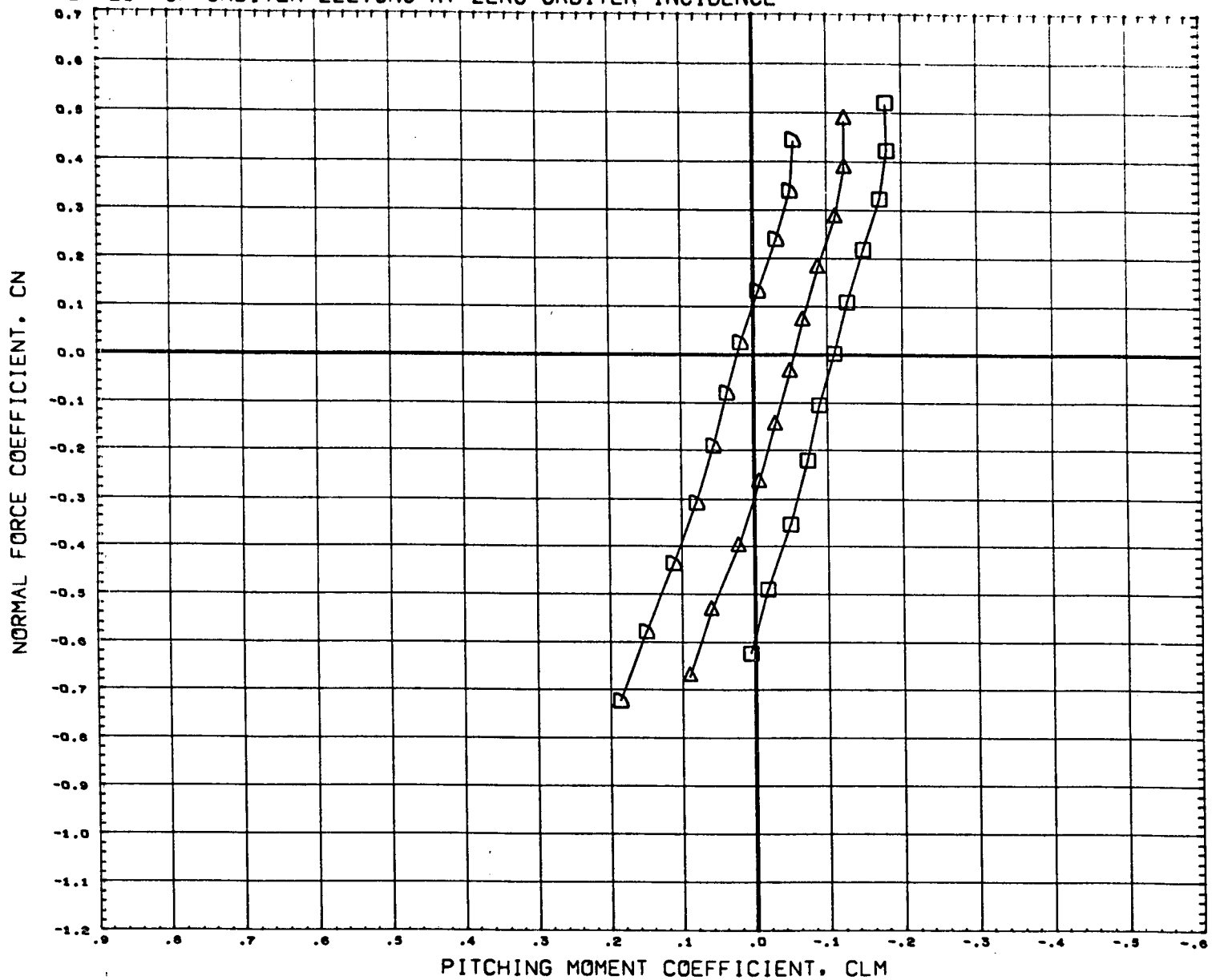
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| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
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MACH

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

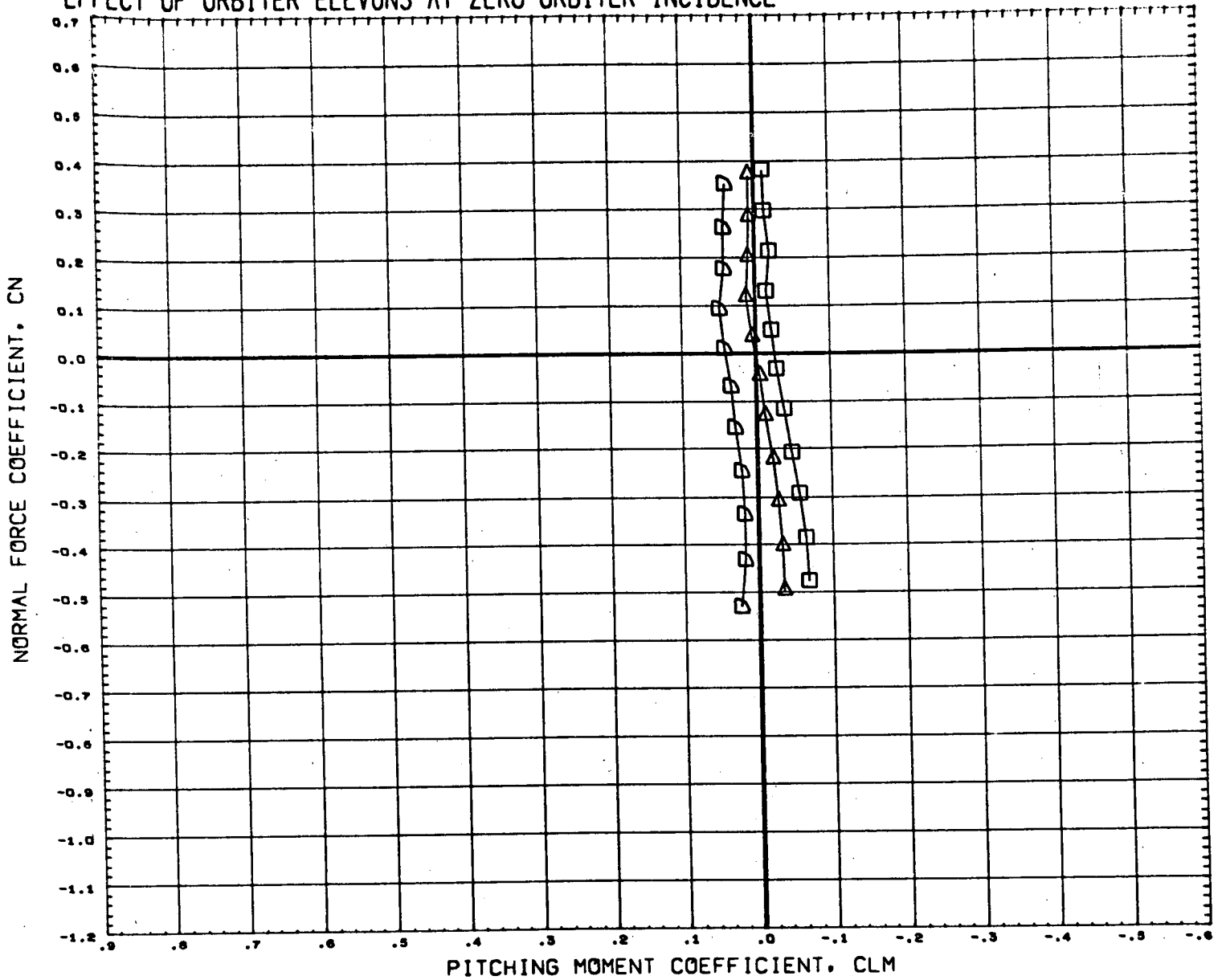


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| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.95

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

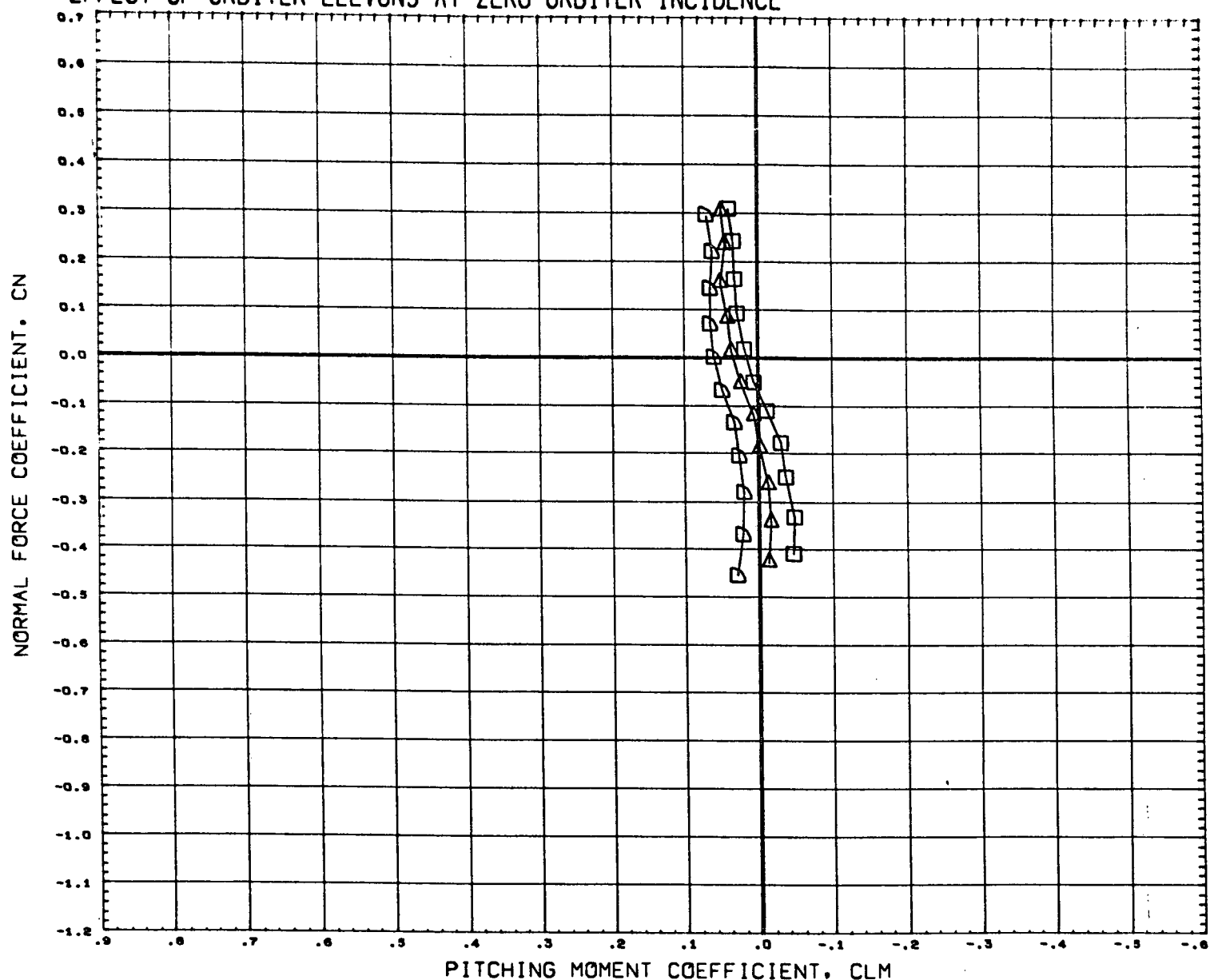


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71099) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71101) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



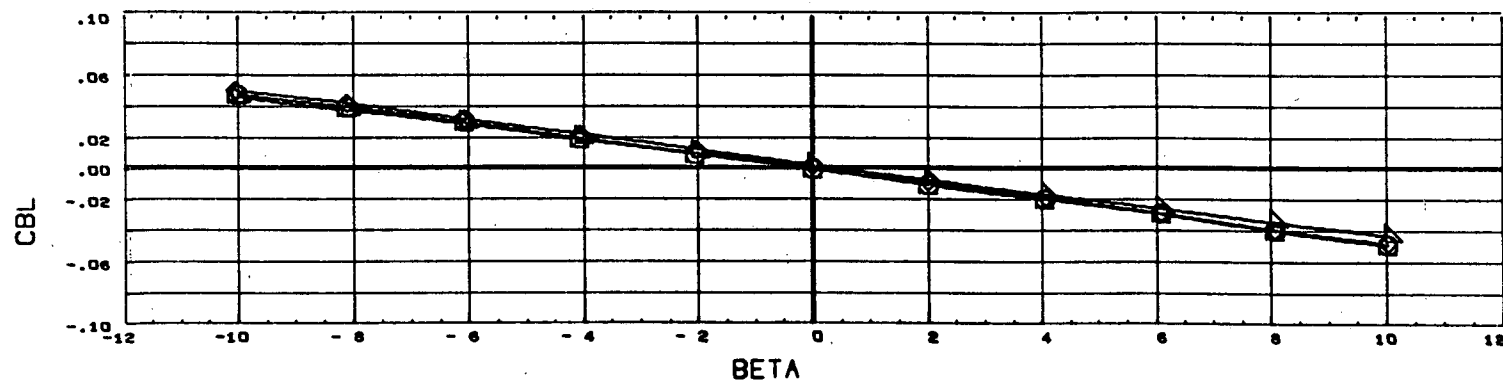
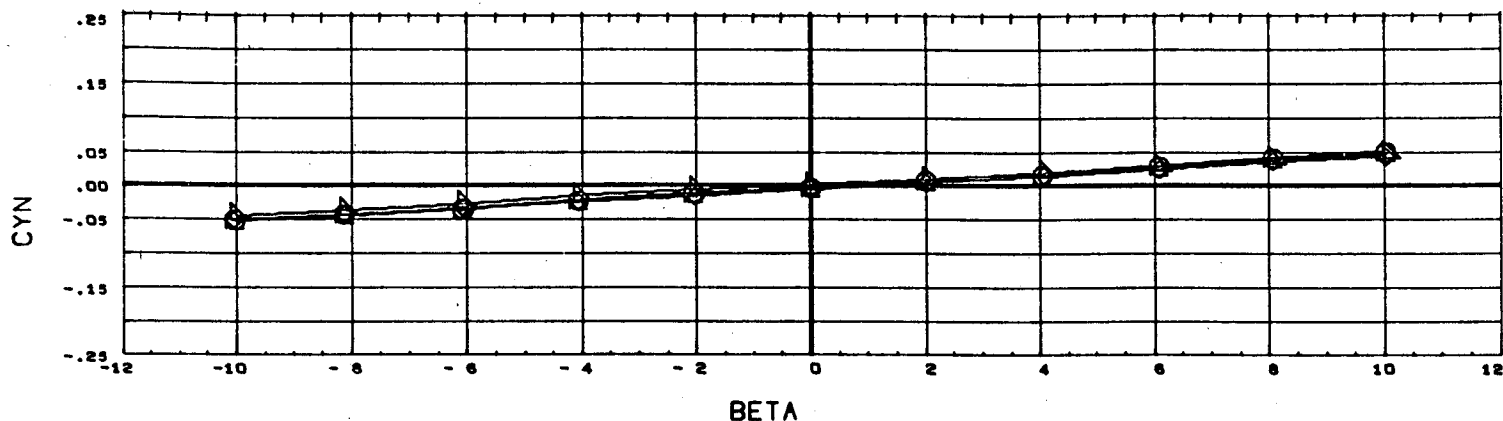
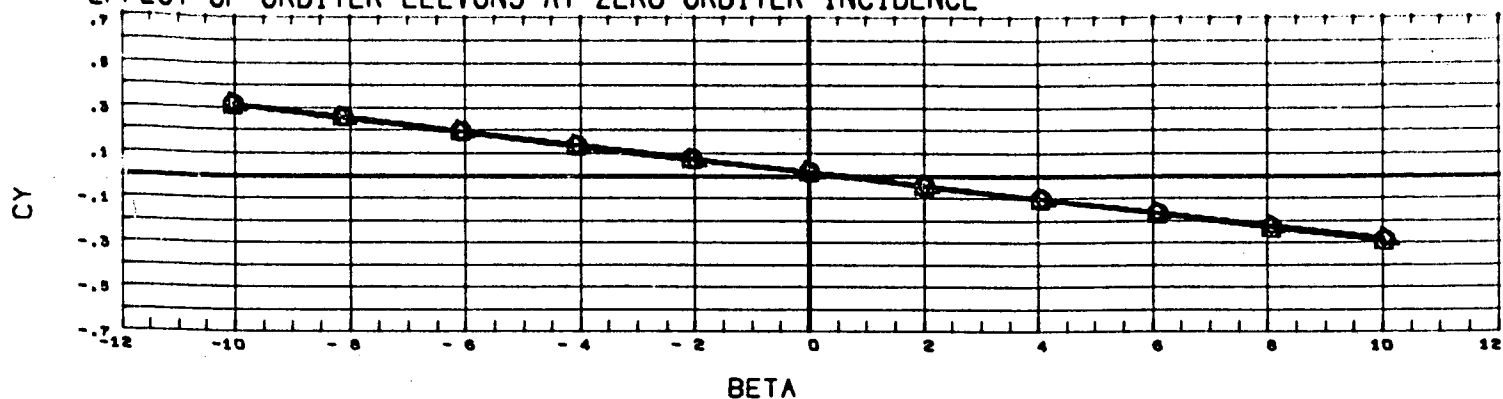
PITCHING MOMENT COEFFICIENT, CLM

| DATA SET, SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|------------------|---|--------|-------|---------|--------|-----------------------|--------|--------|
| (871069) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 90 IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (871097) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (871099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (871103) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (871101) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 4.96

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

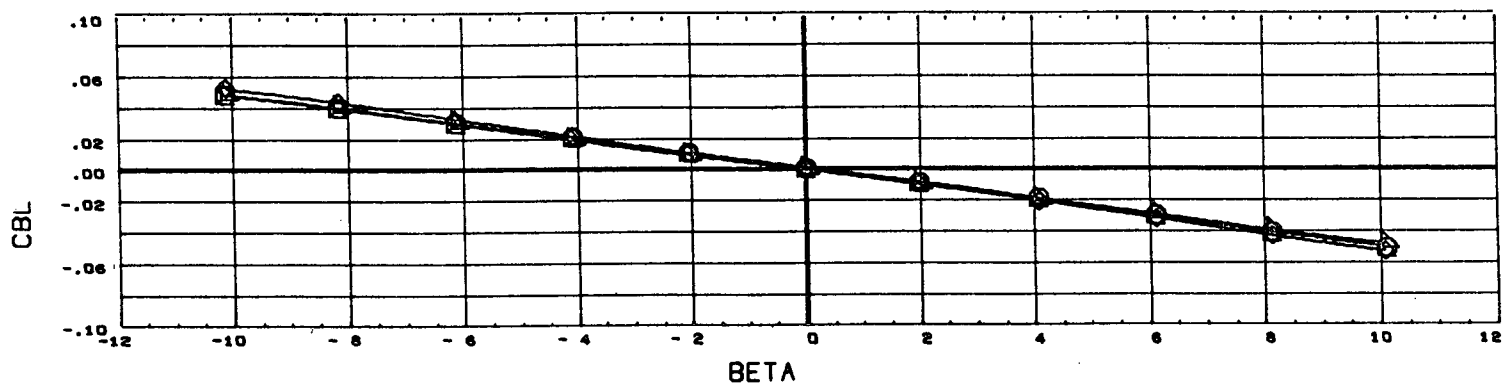
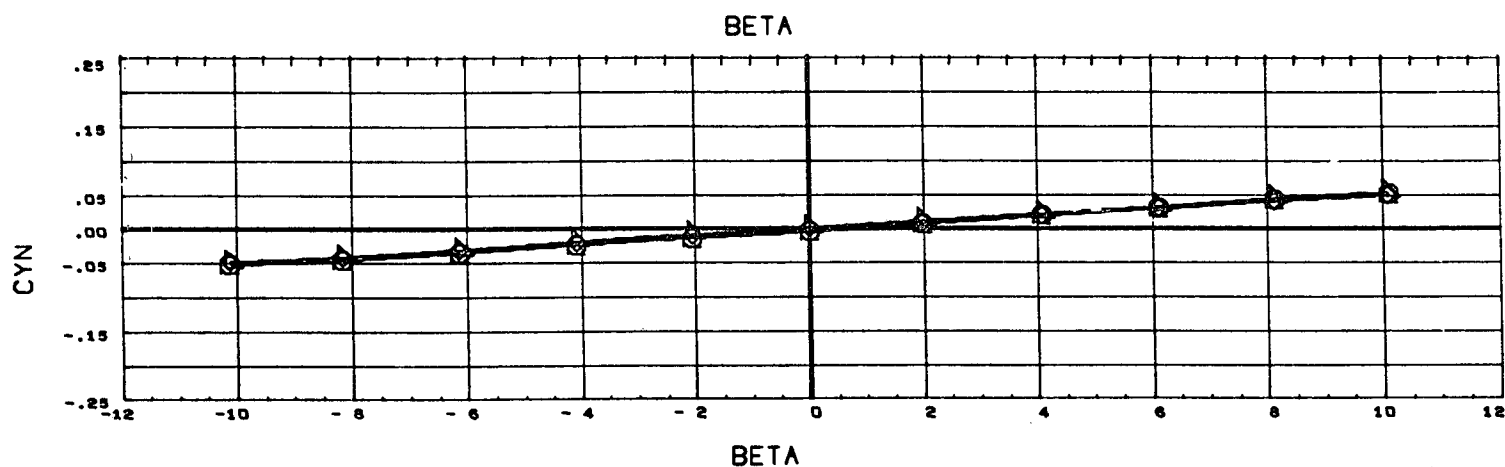
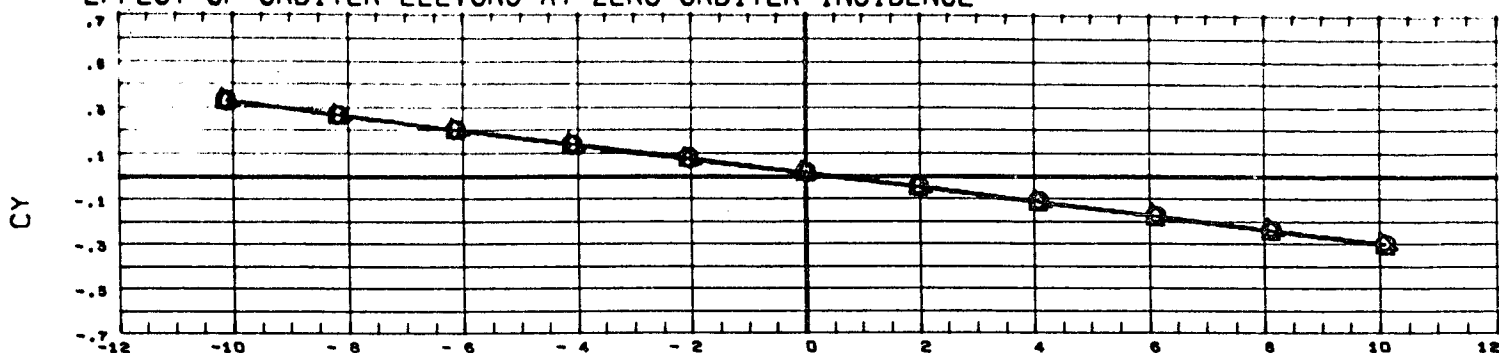


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

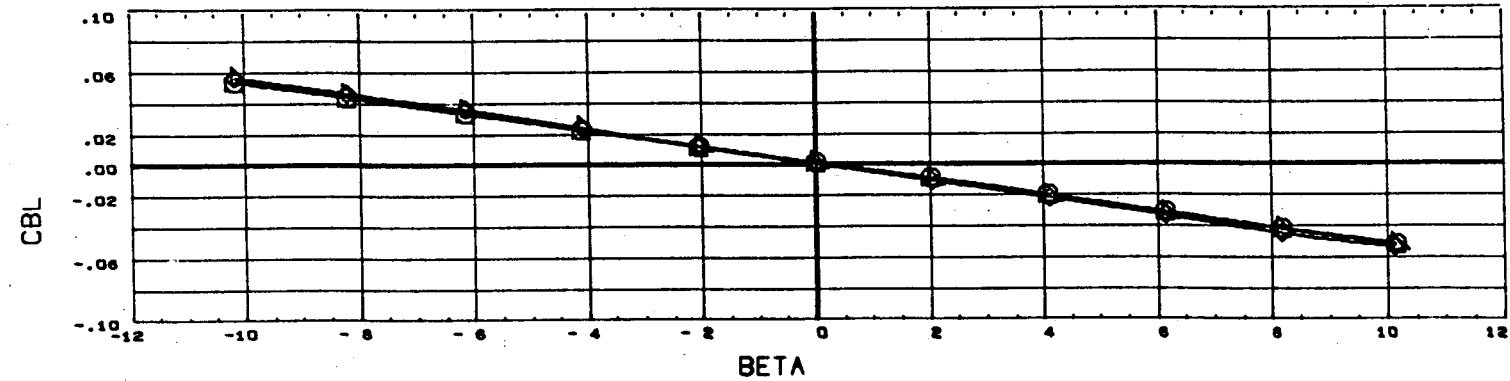
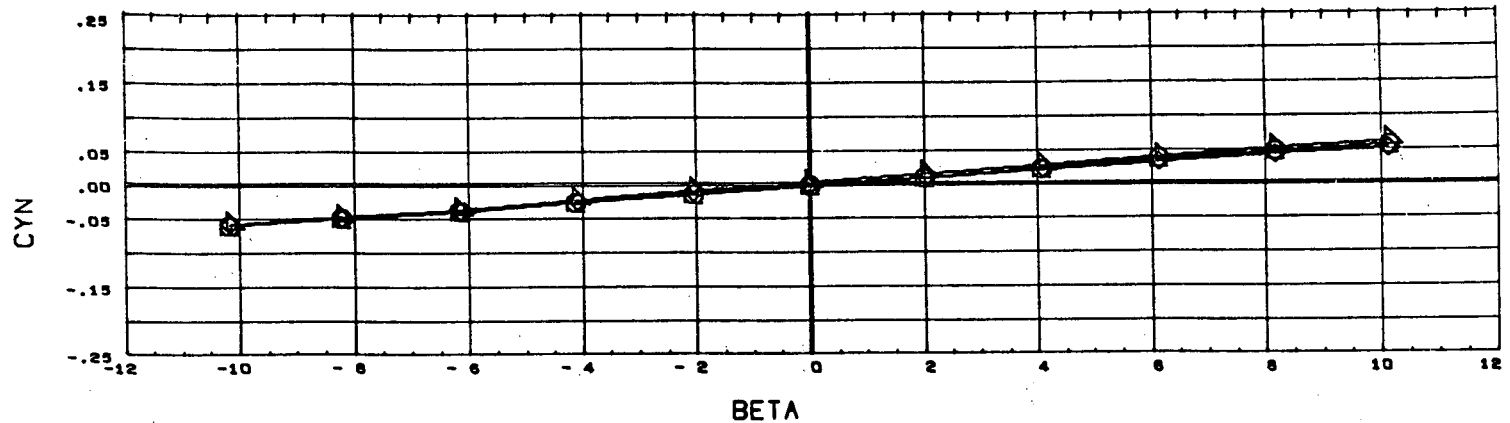
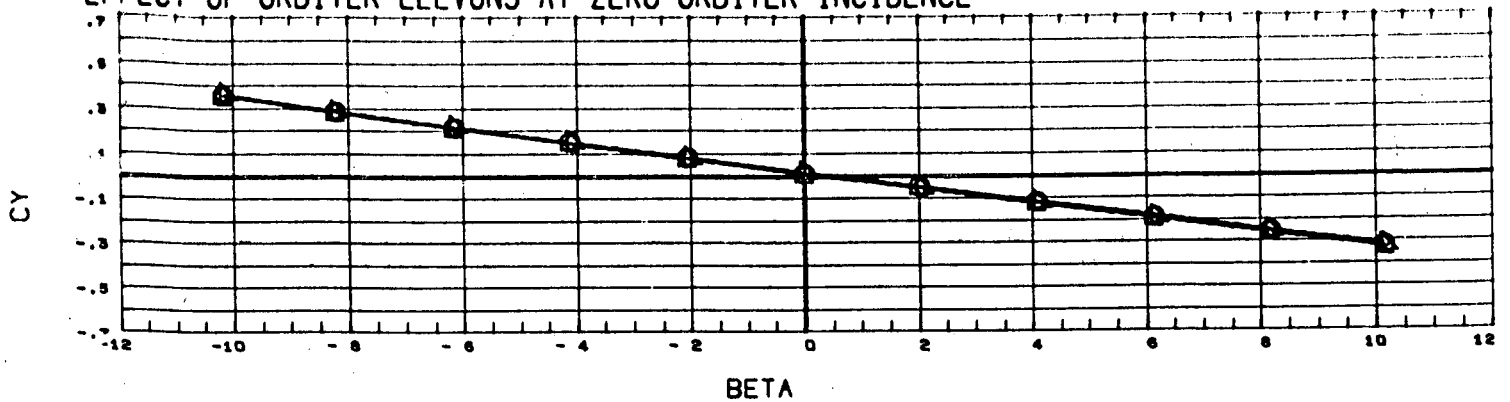


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 30. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH .80

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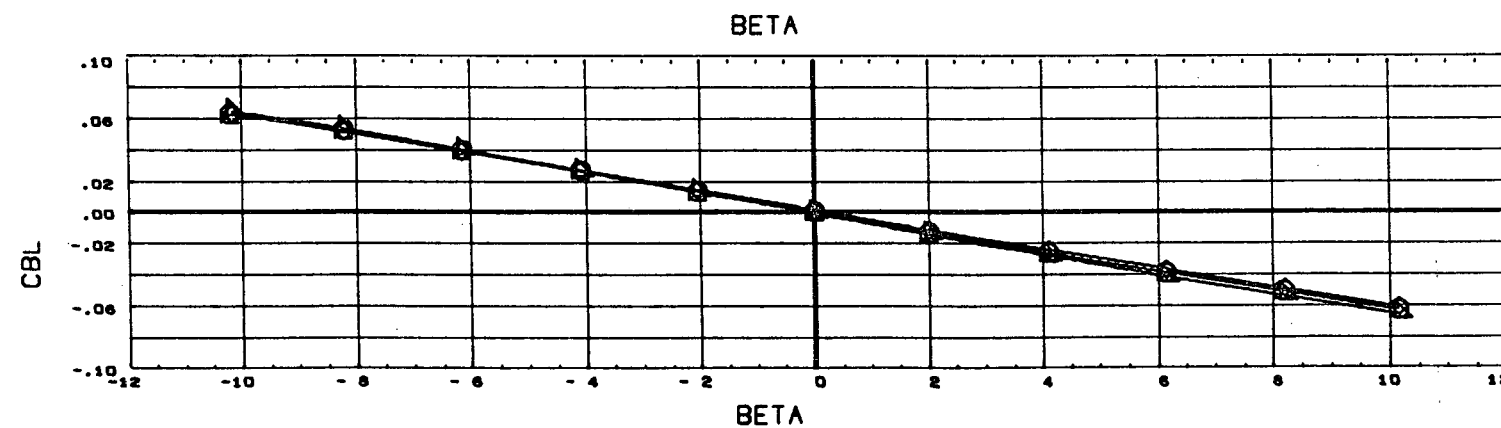
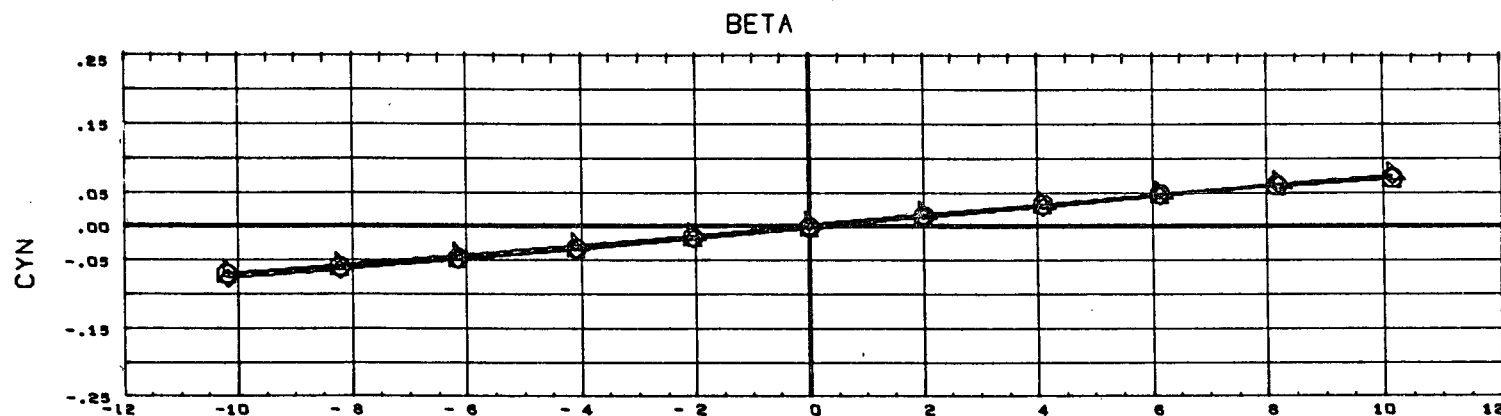
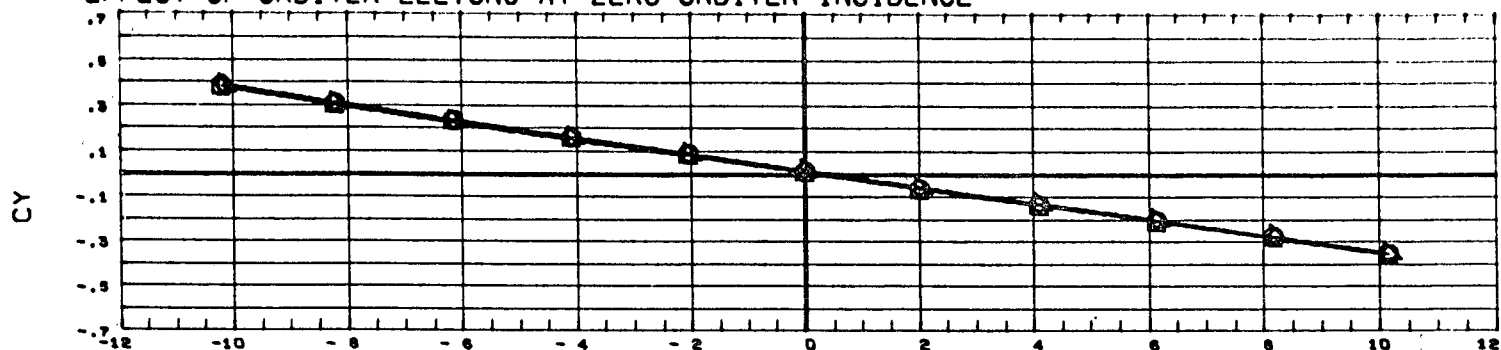
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH .90

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

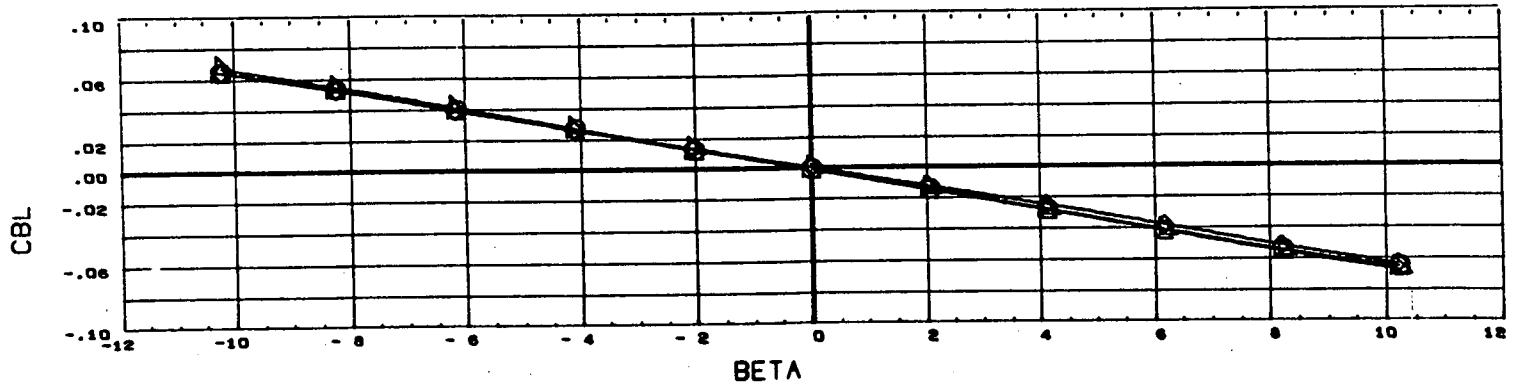
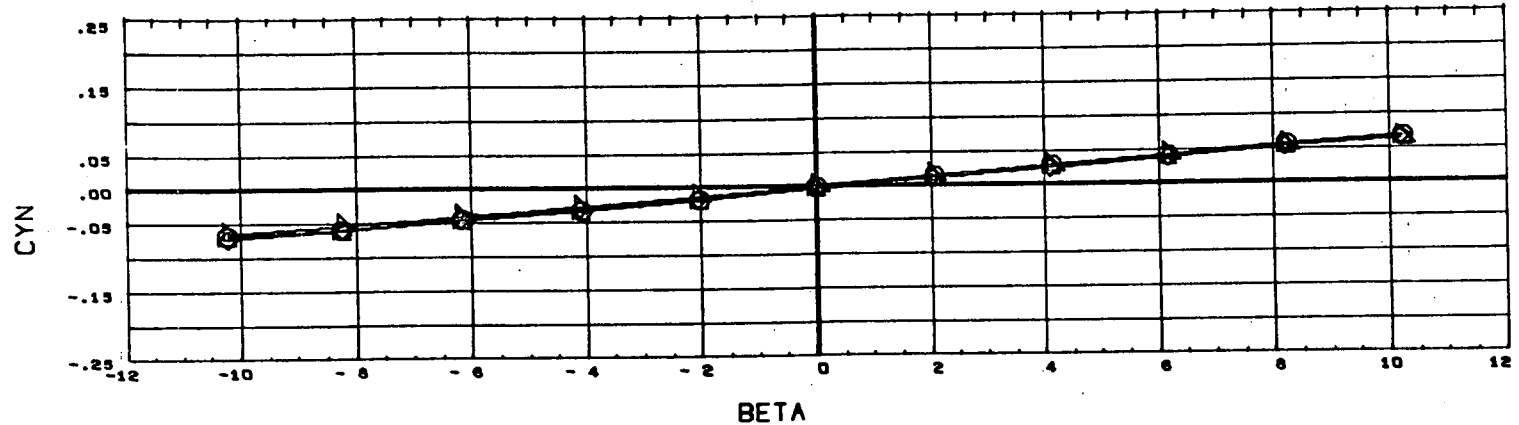
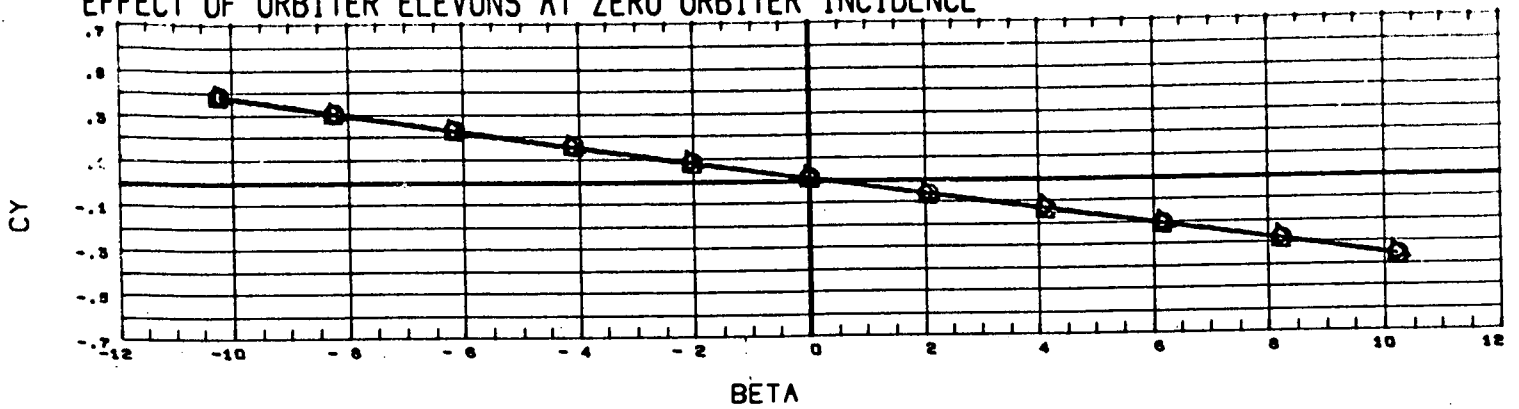


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.00

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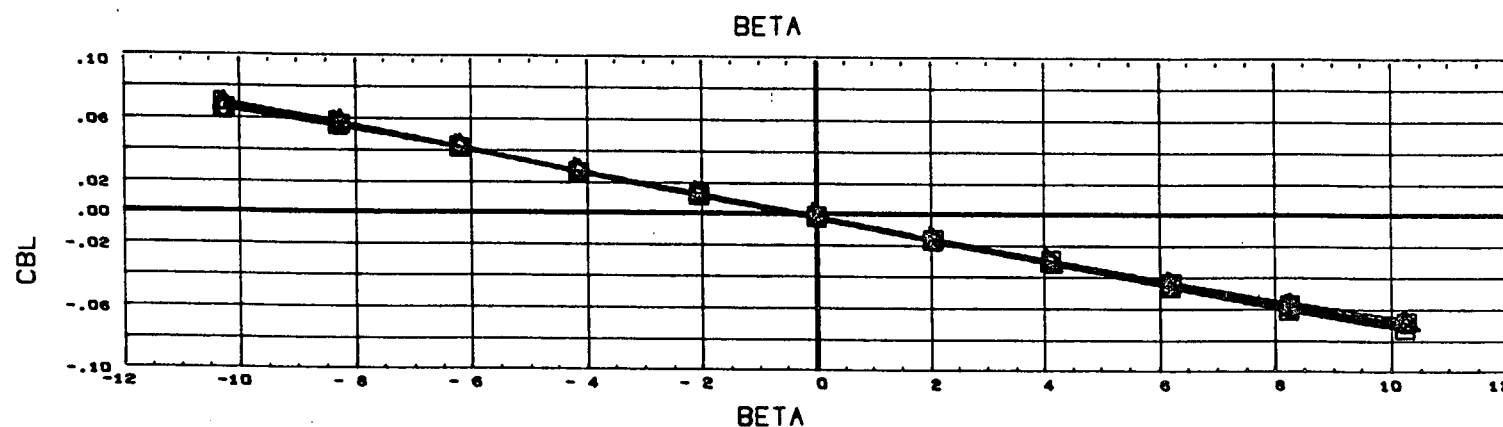
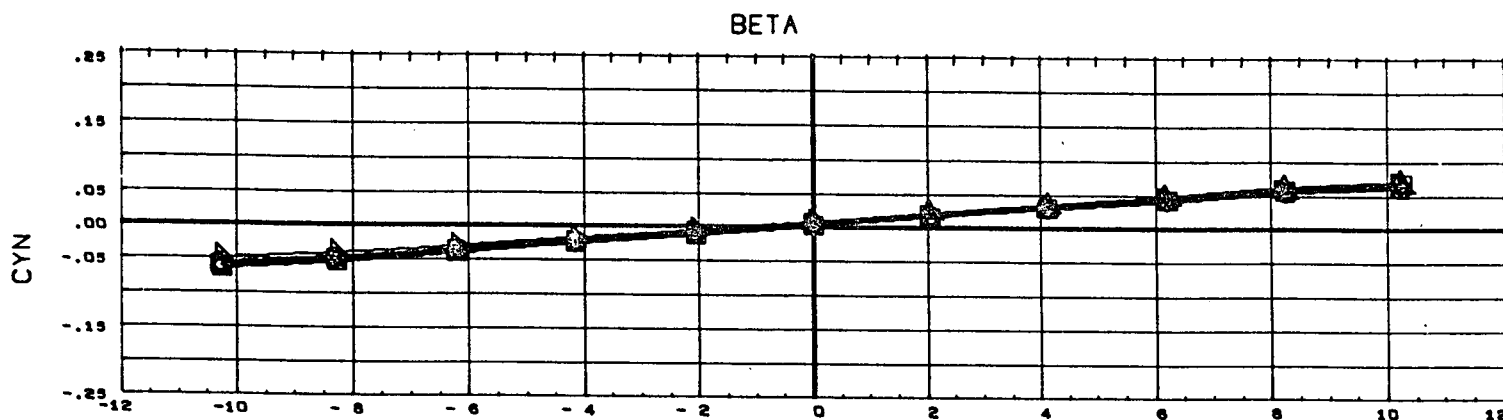
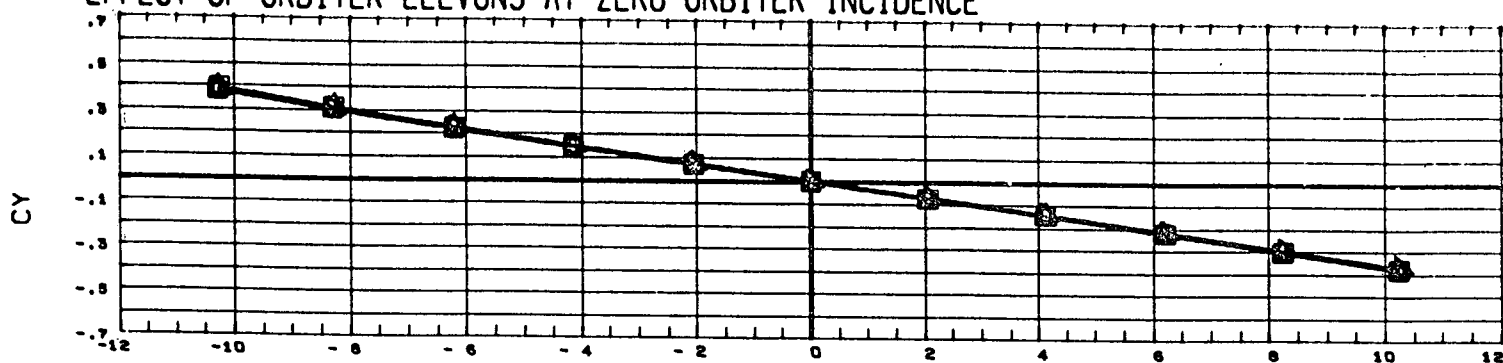
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMHP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMHP | 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMHP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

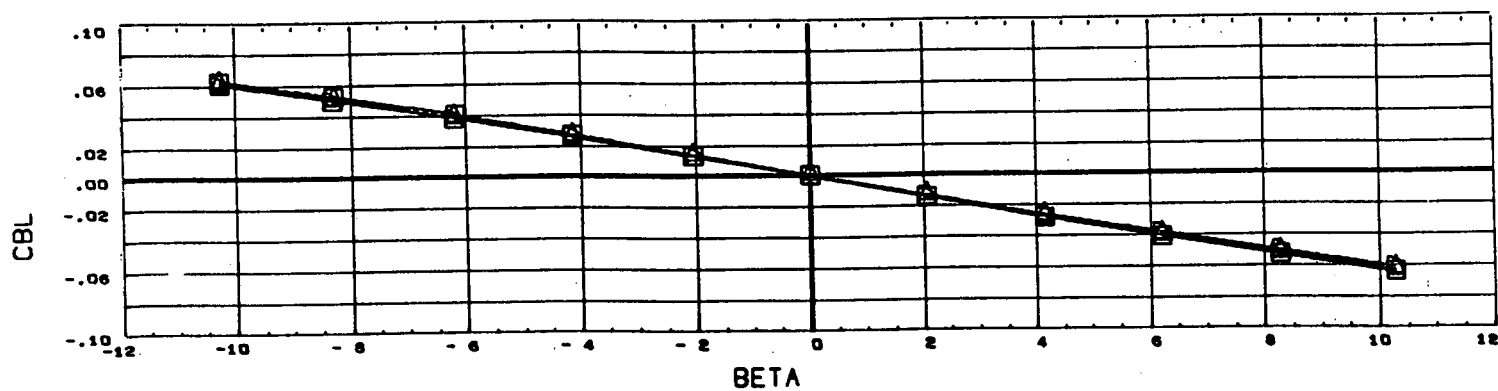
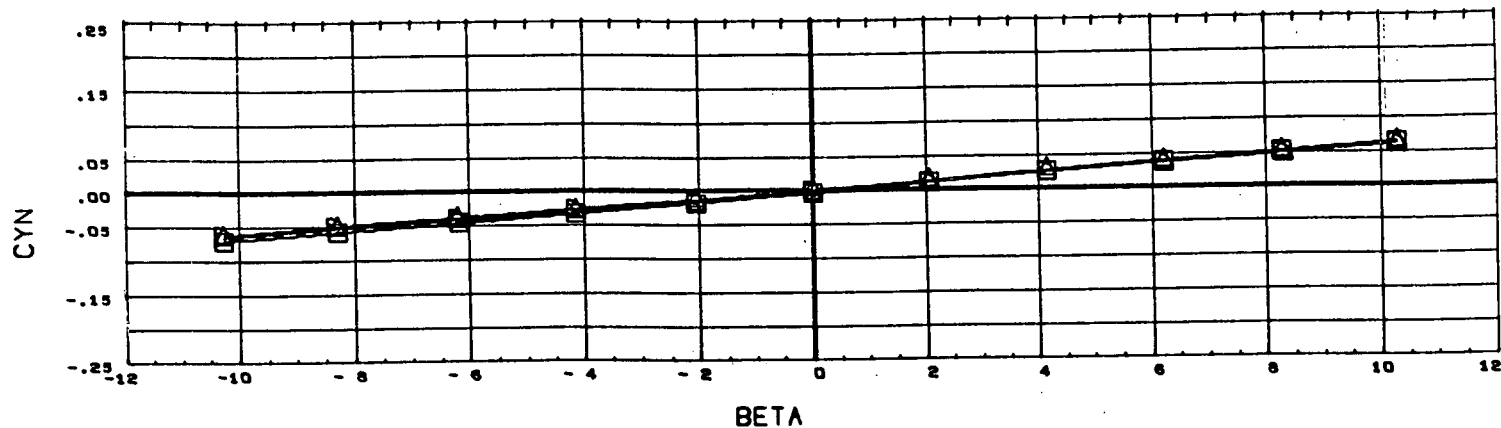
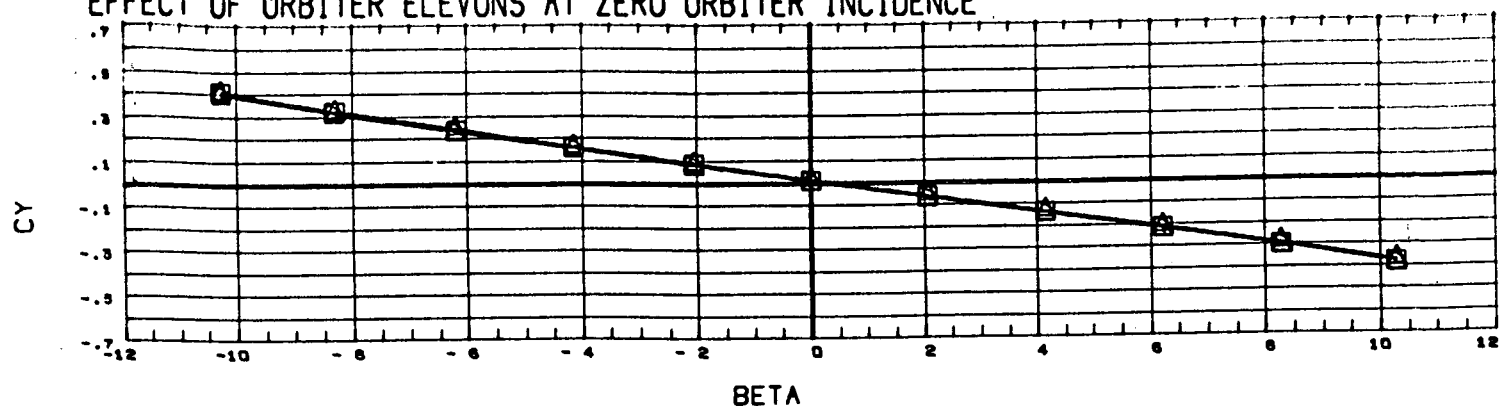
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---|---------|-------|---------|--------|-----------------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRF 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF 0.2460 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH 1.20

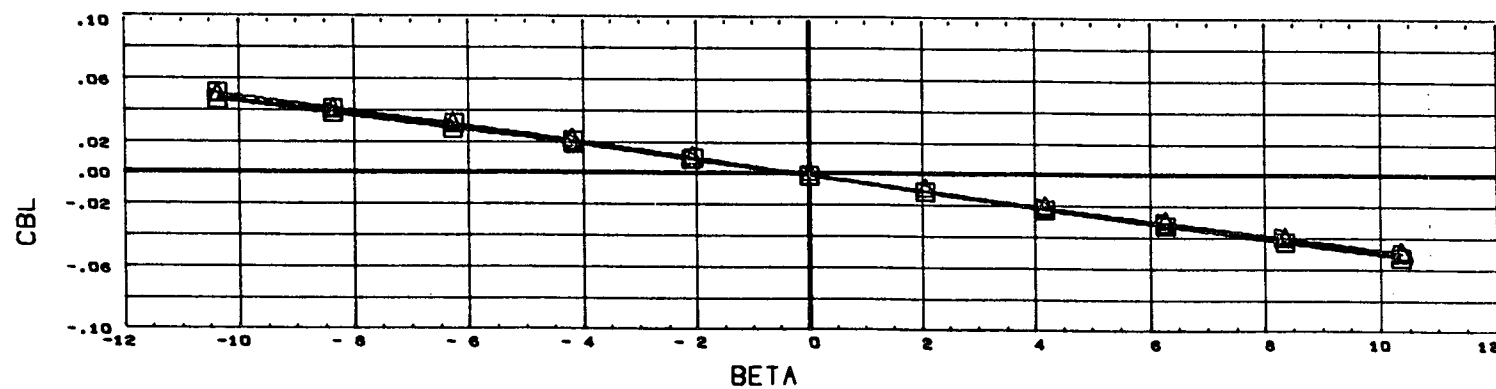
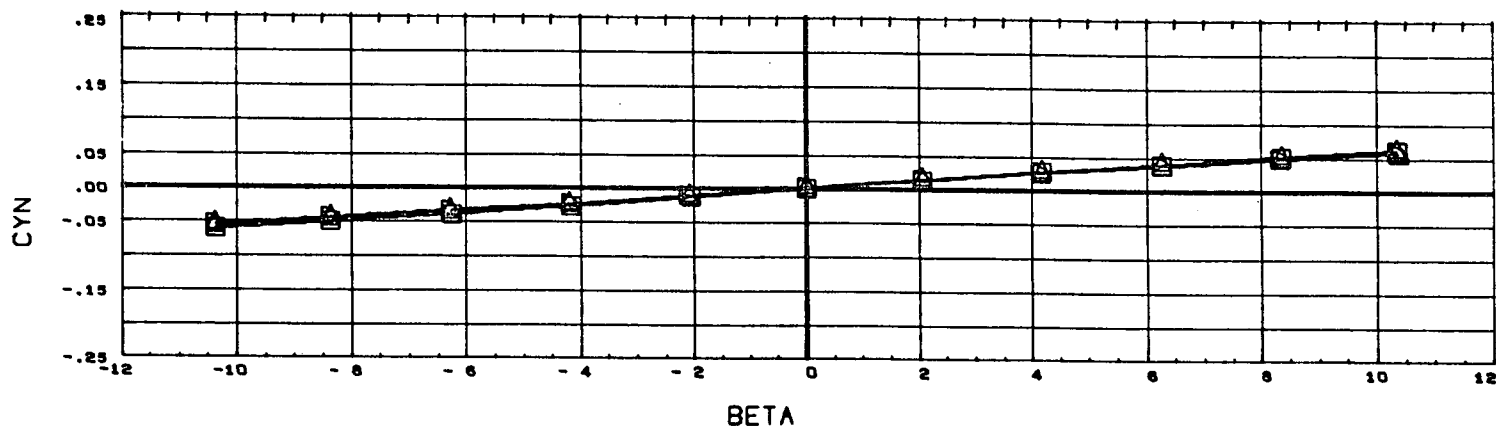
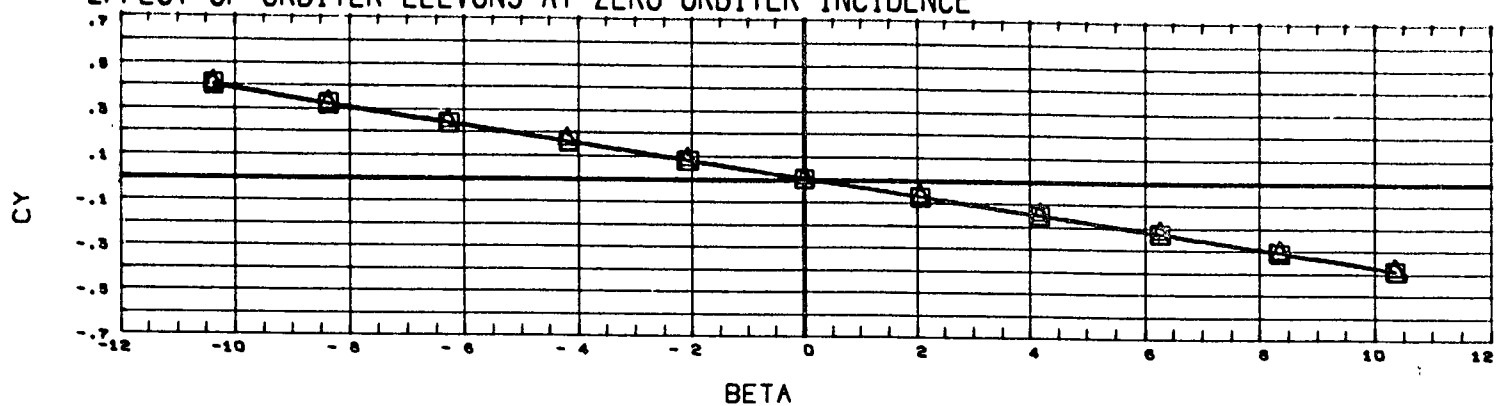
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMPP | 3.3600 IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMPP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMPP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

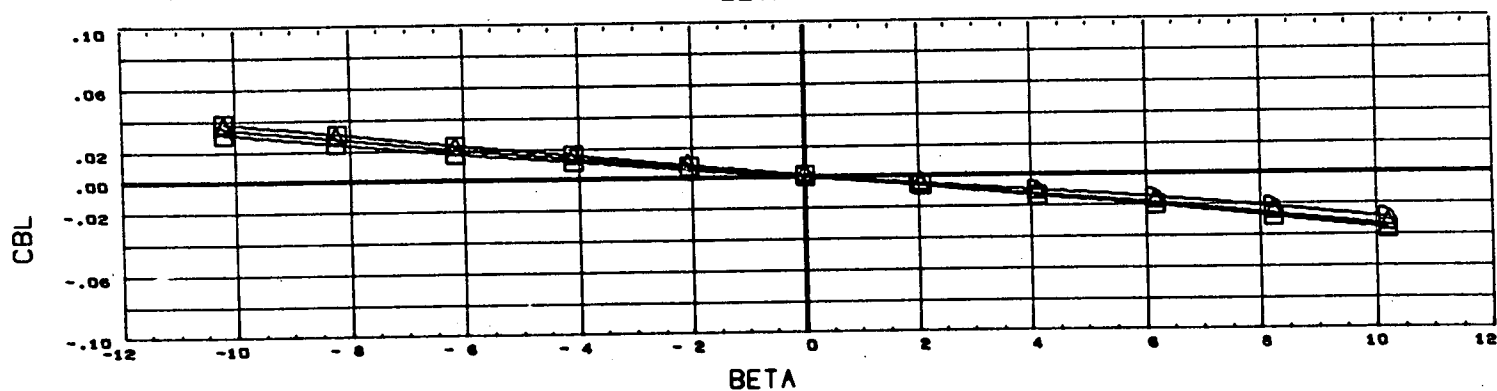
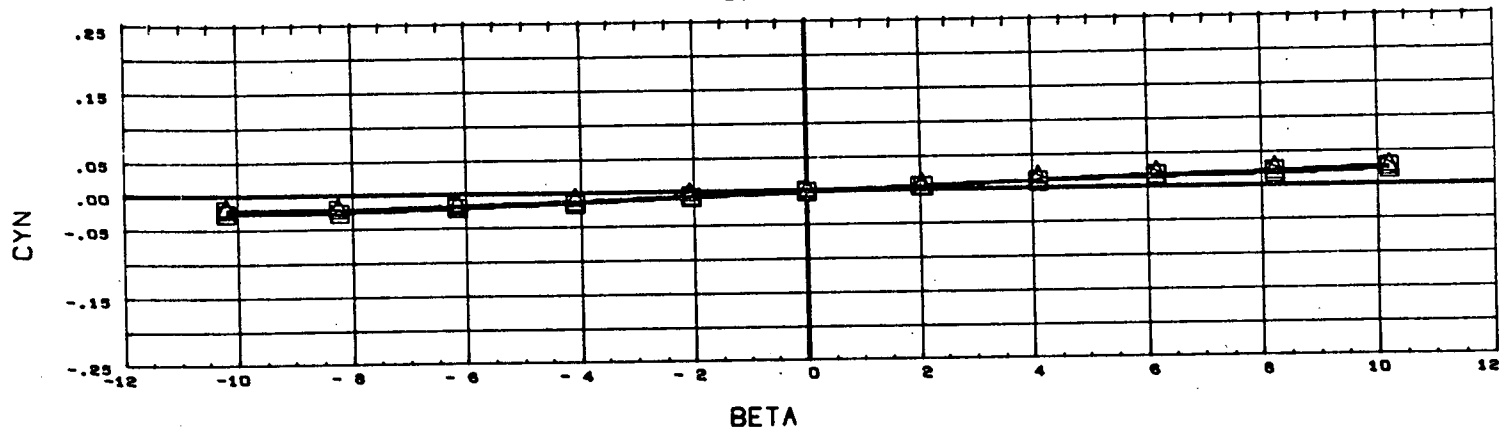
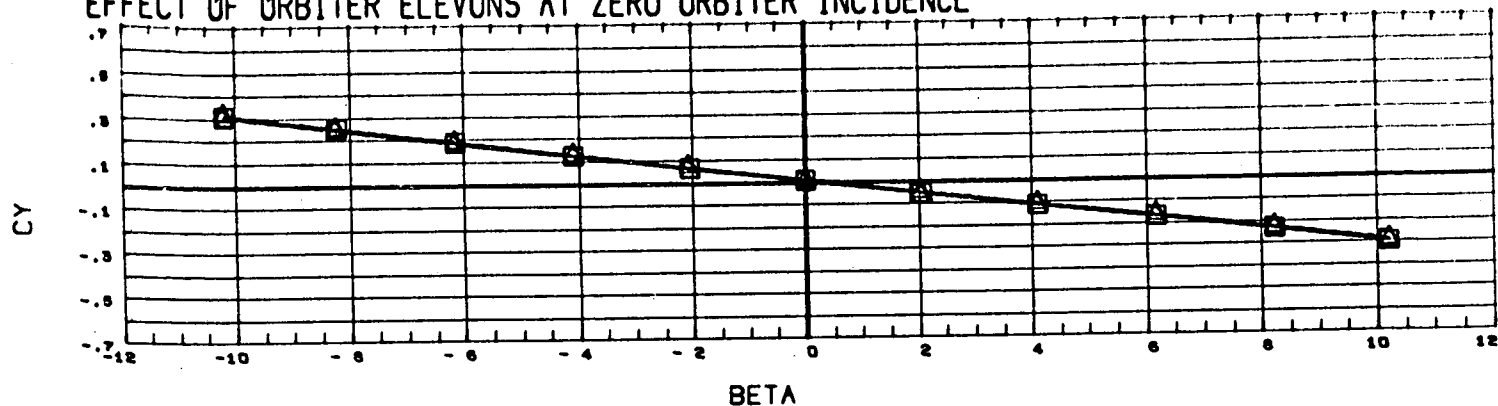
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71096) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

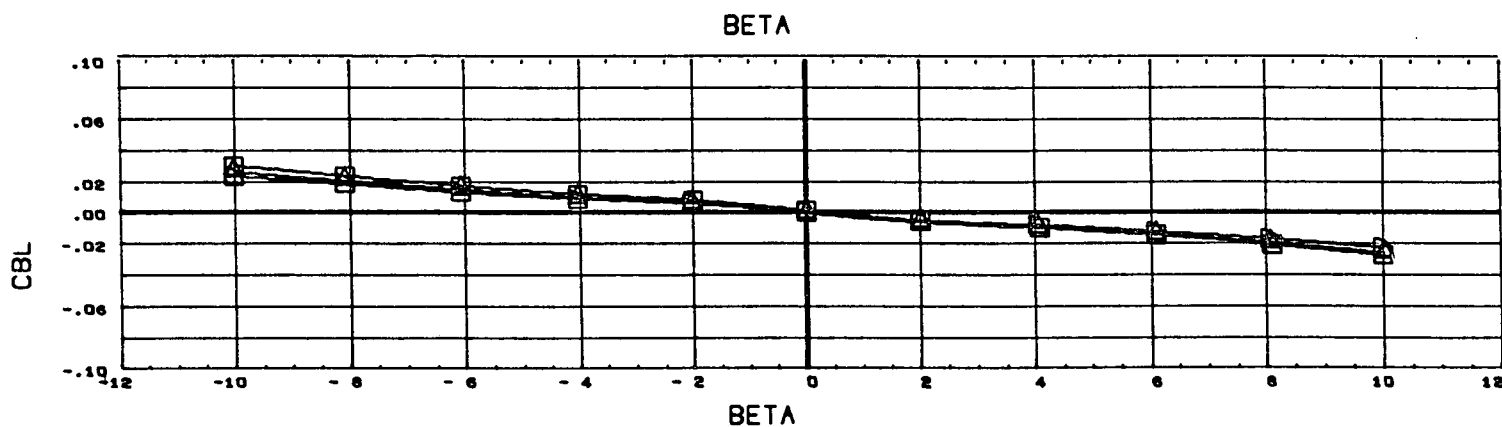
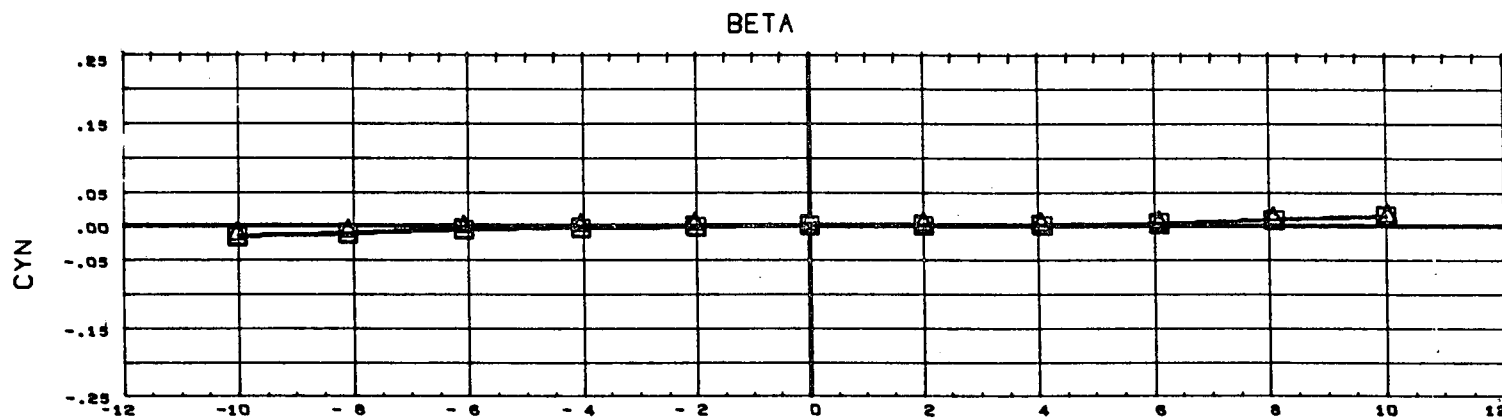
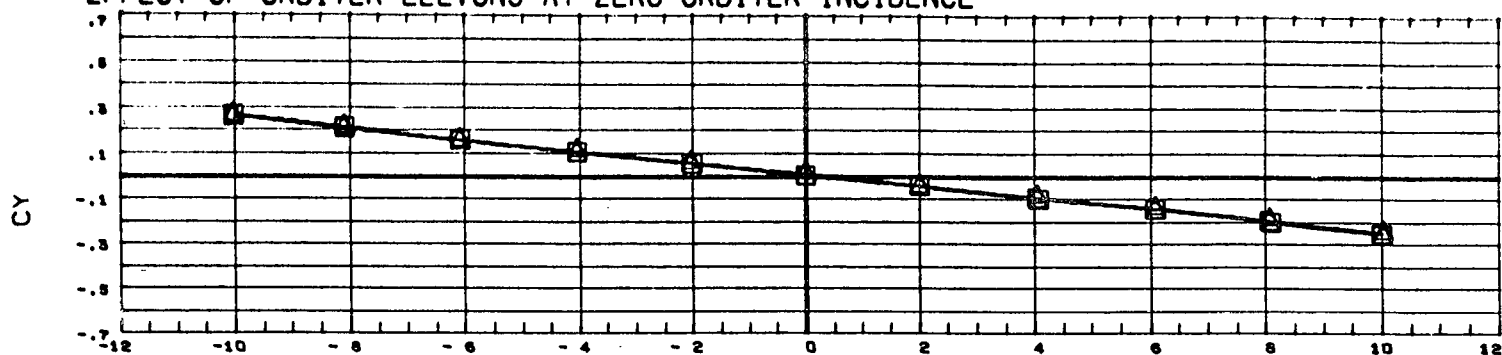
EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4800 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

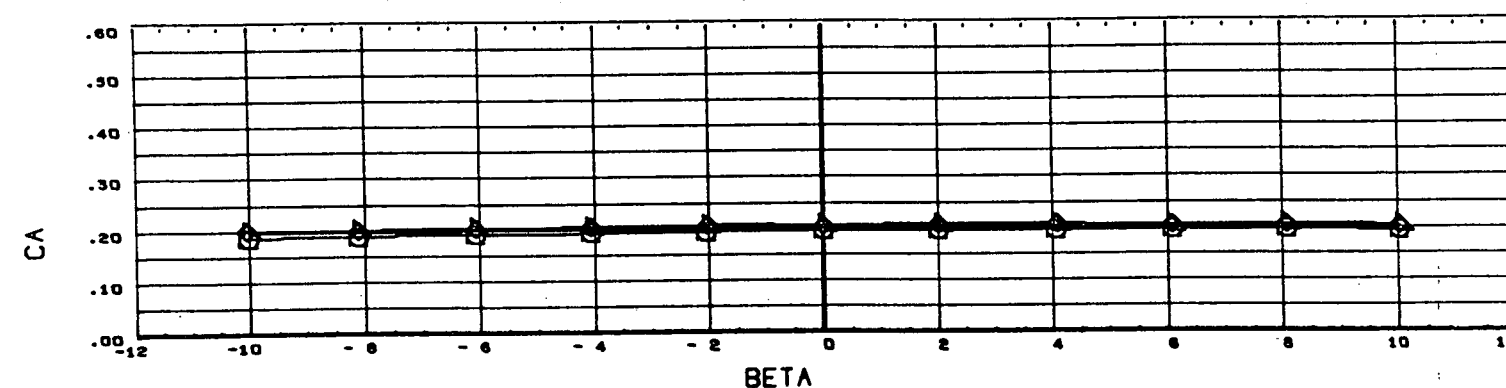
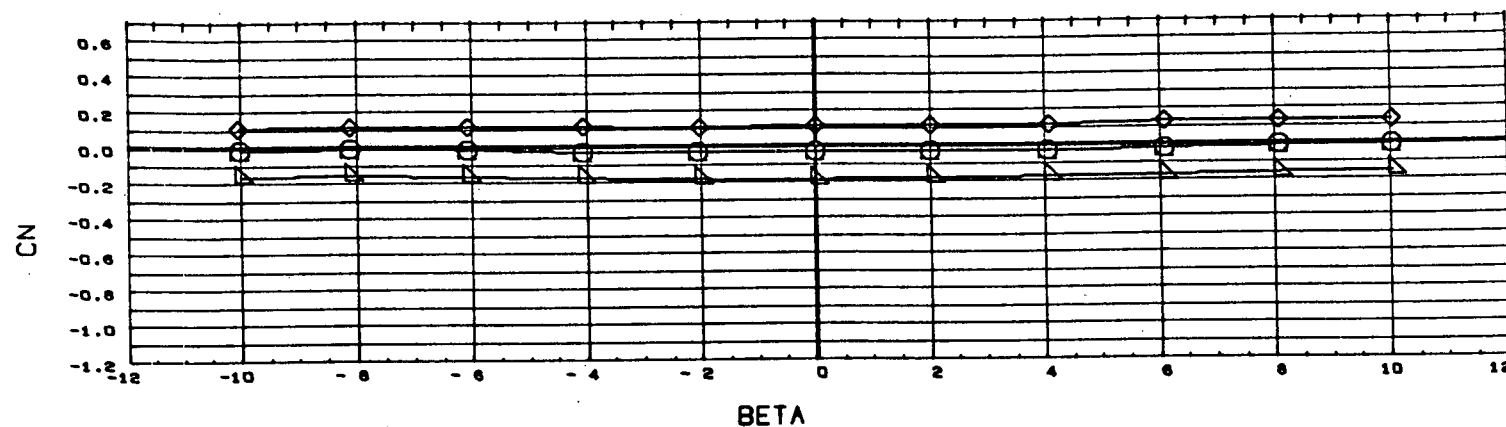
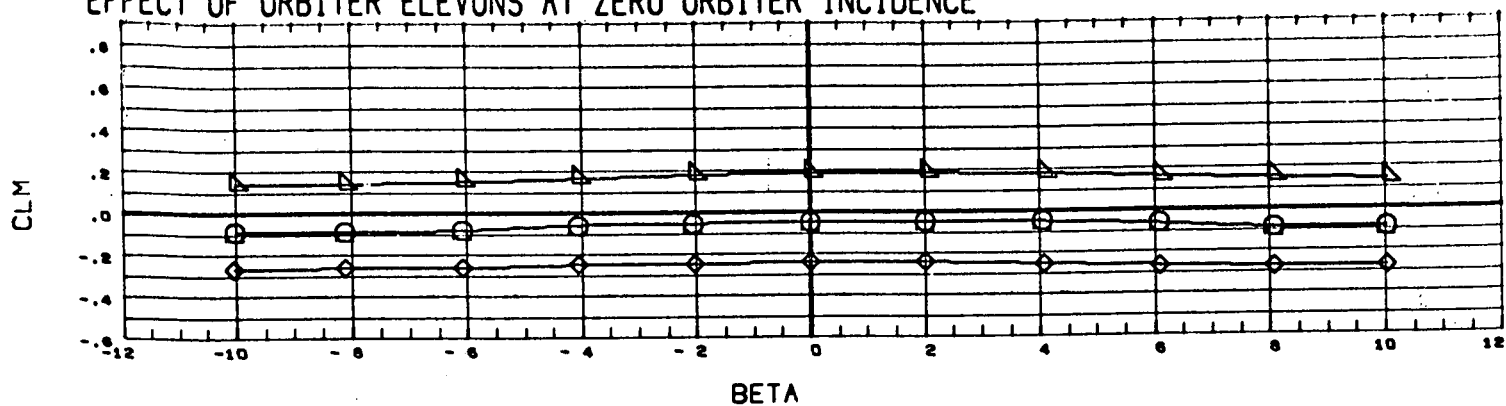


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 | SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (A71098) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 4.96

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

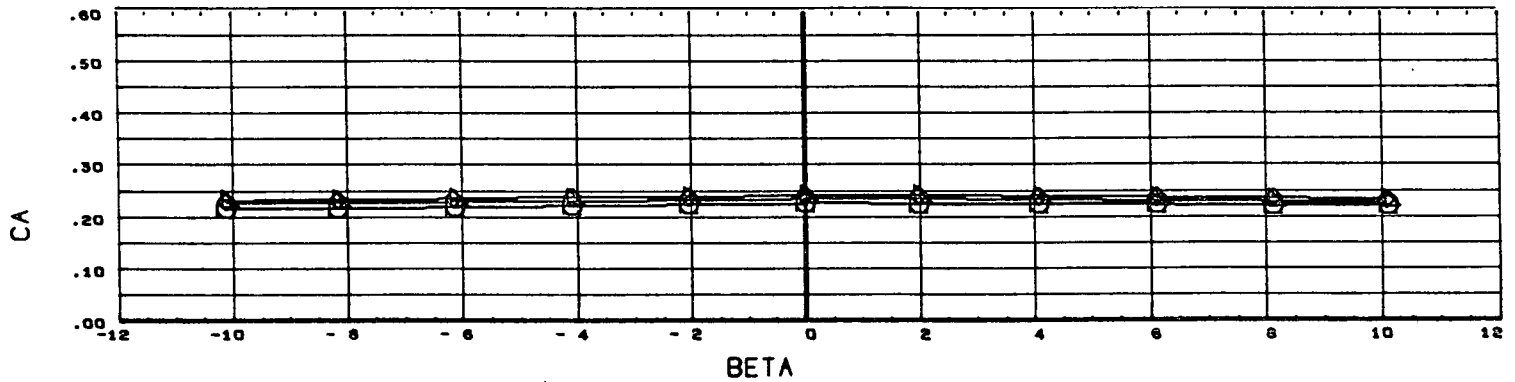
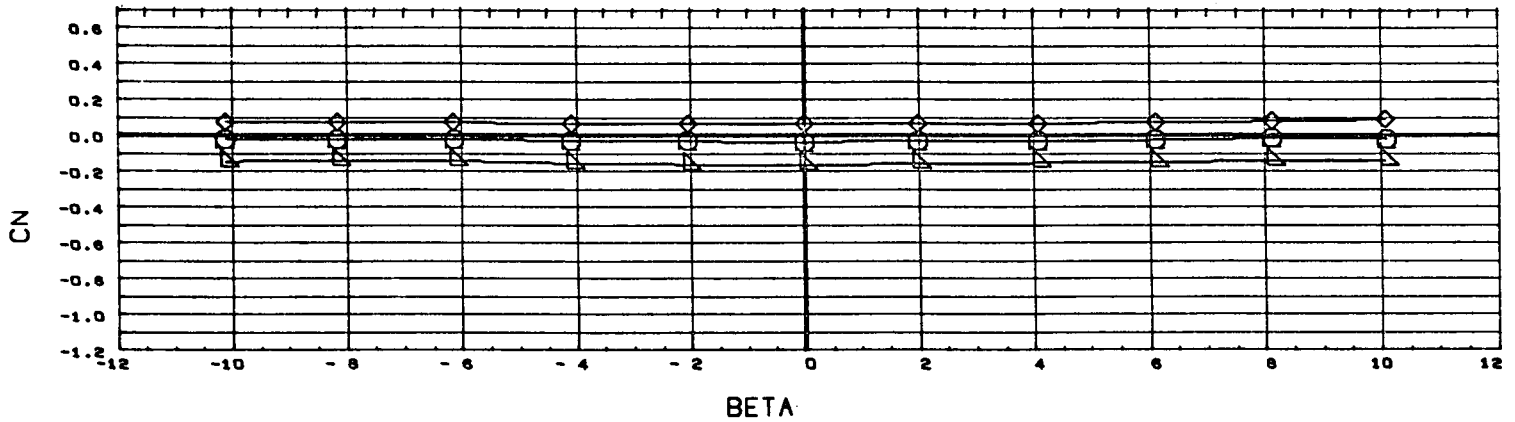
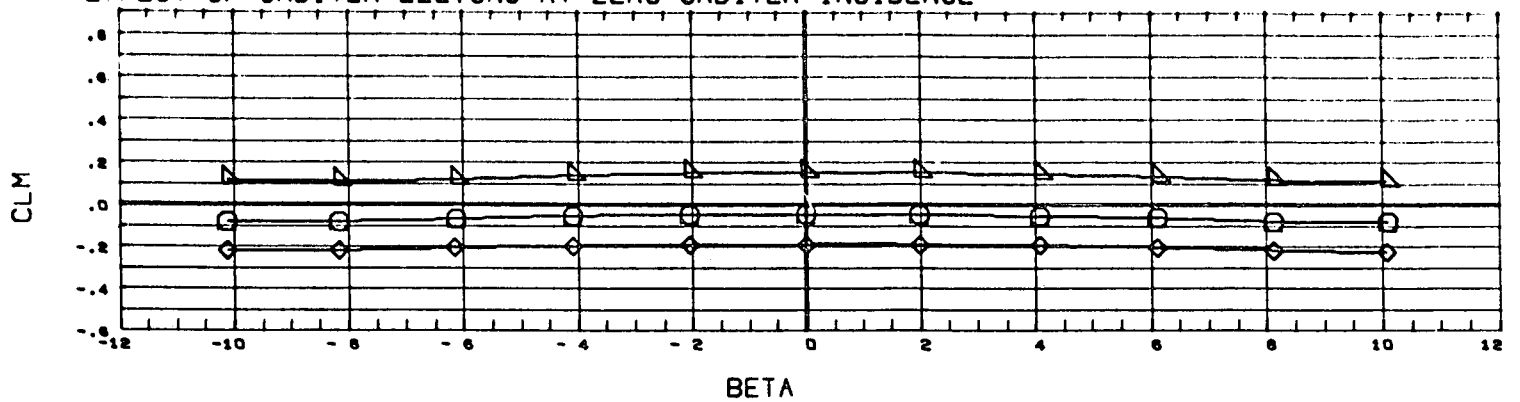


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---------------------------------------|--------|-------|---------|--------|-----------------------|--------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.60

EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

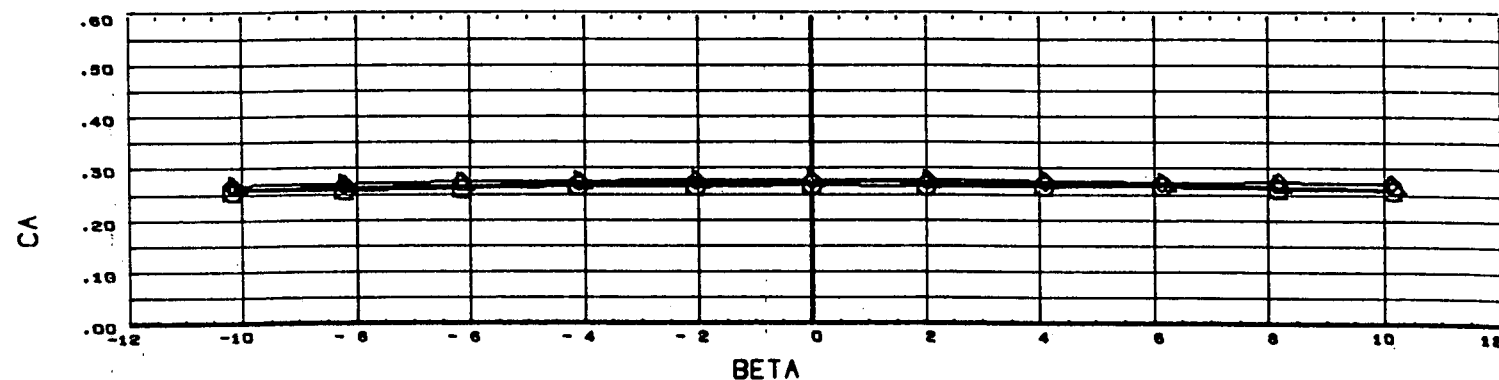
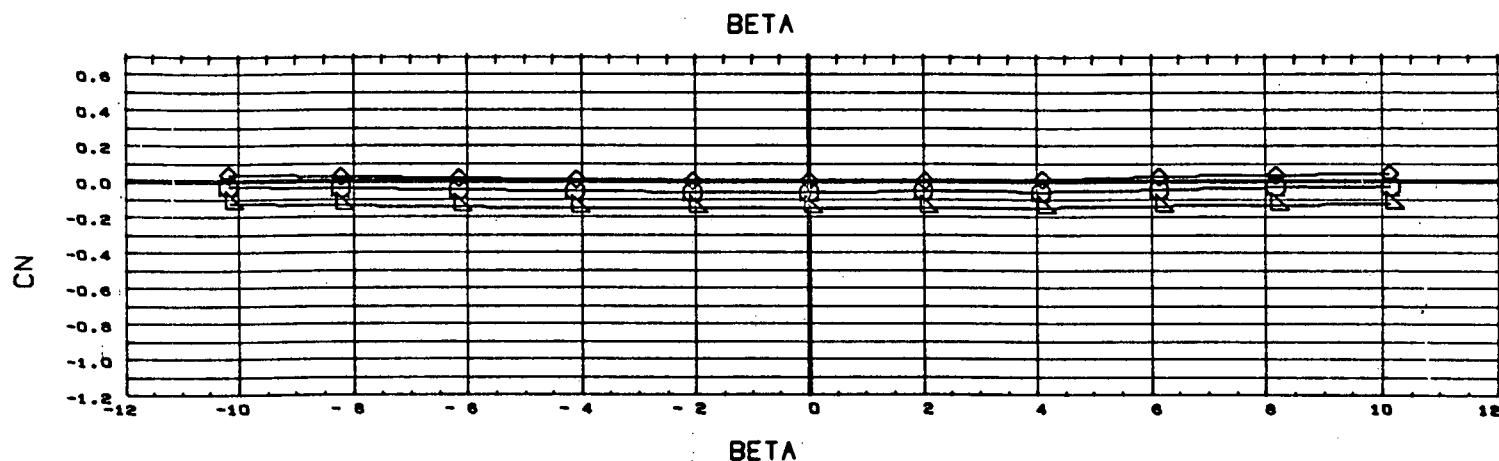
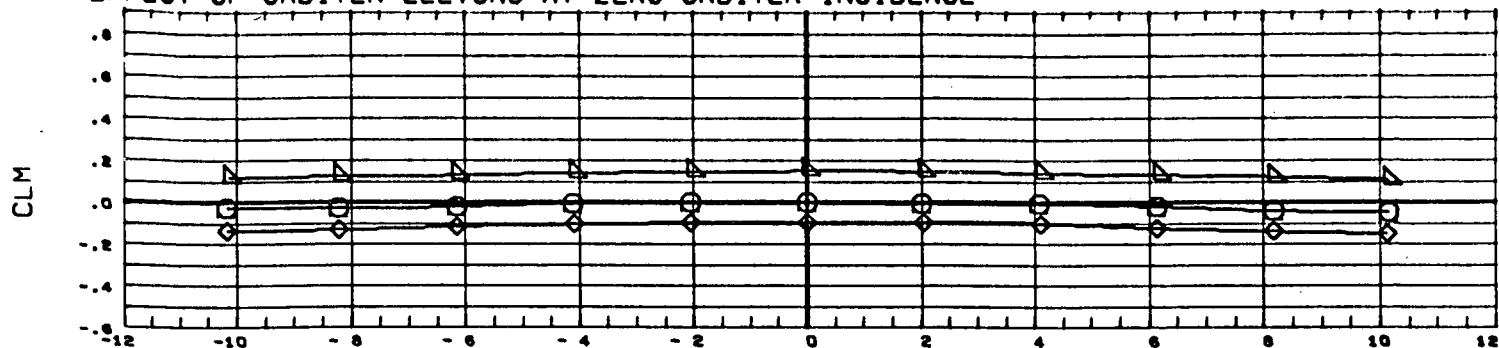


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---------------------------------------|---------|-------|--------|---------|-----------------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | 0.000 | SREF 7.6900 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | 0.000 | LREF 2.0280 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | 10.000 | BREF 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | 10.000 | XMRP 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 | 0.000 | 0.023 | -10.000 | YMRP 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | -10.000 | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH .80

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

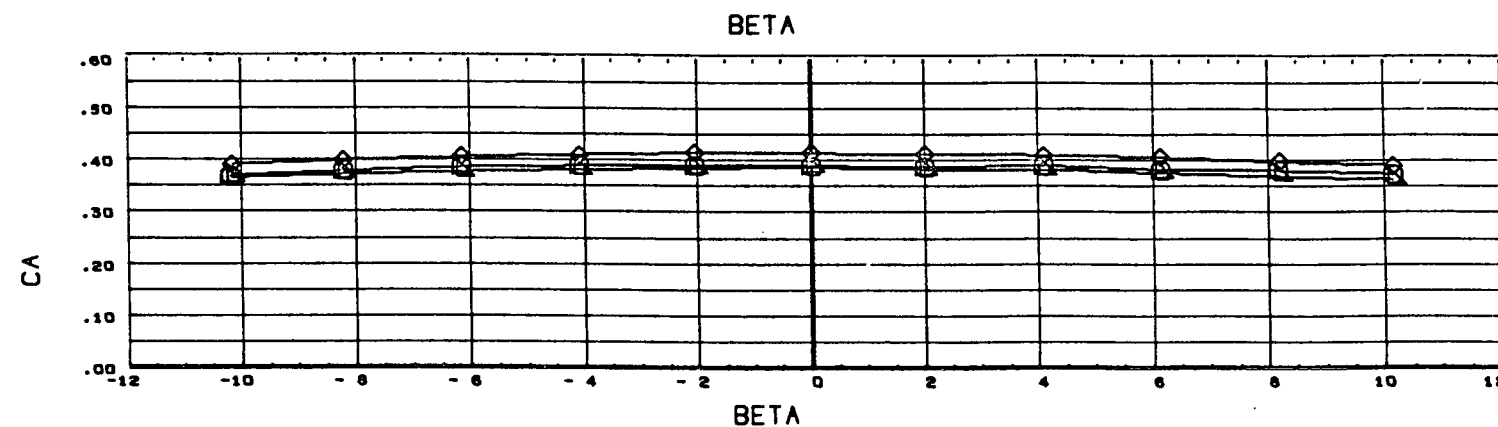
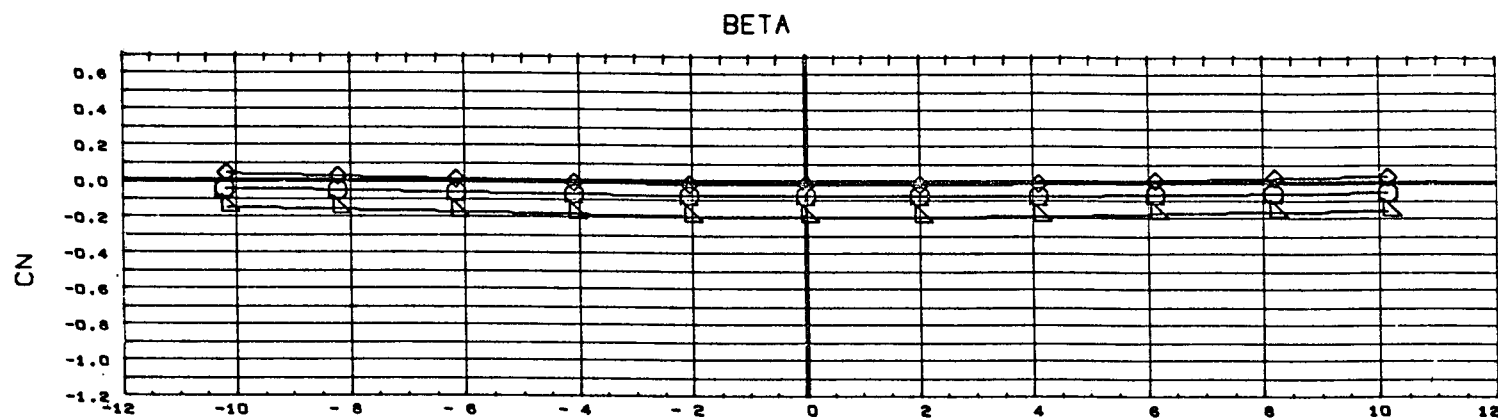
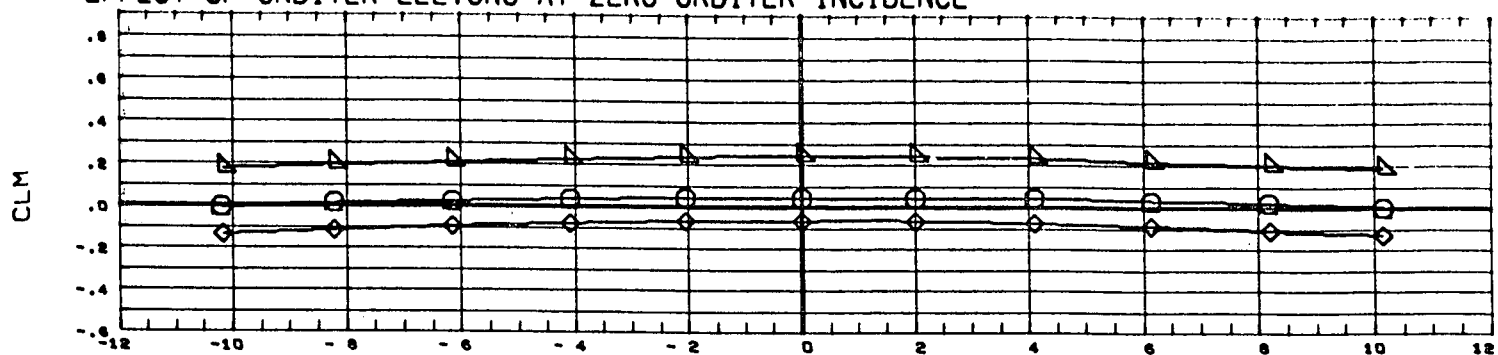


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XHRP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YHRP | 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

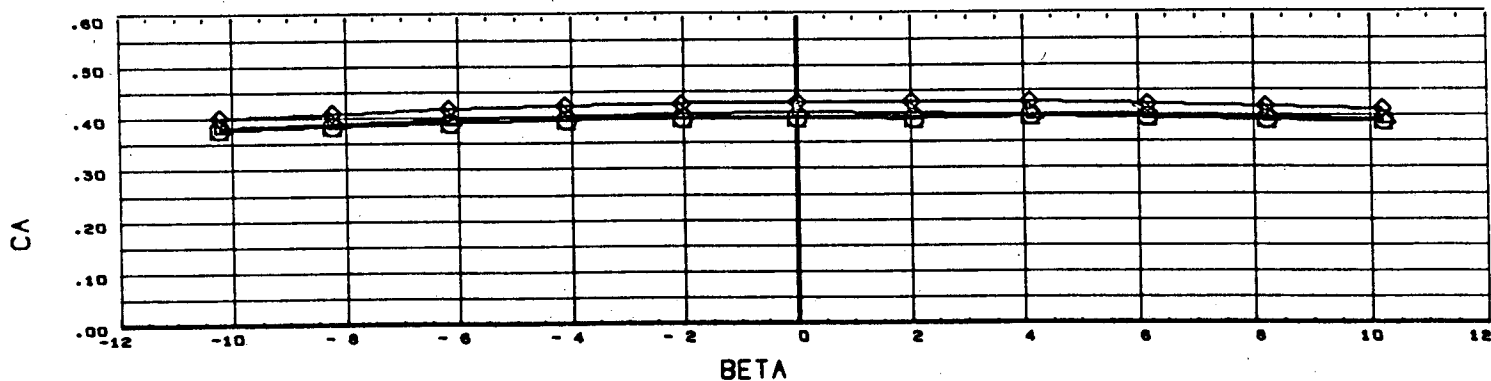
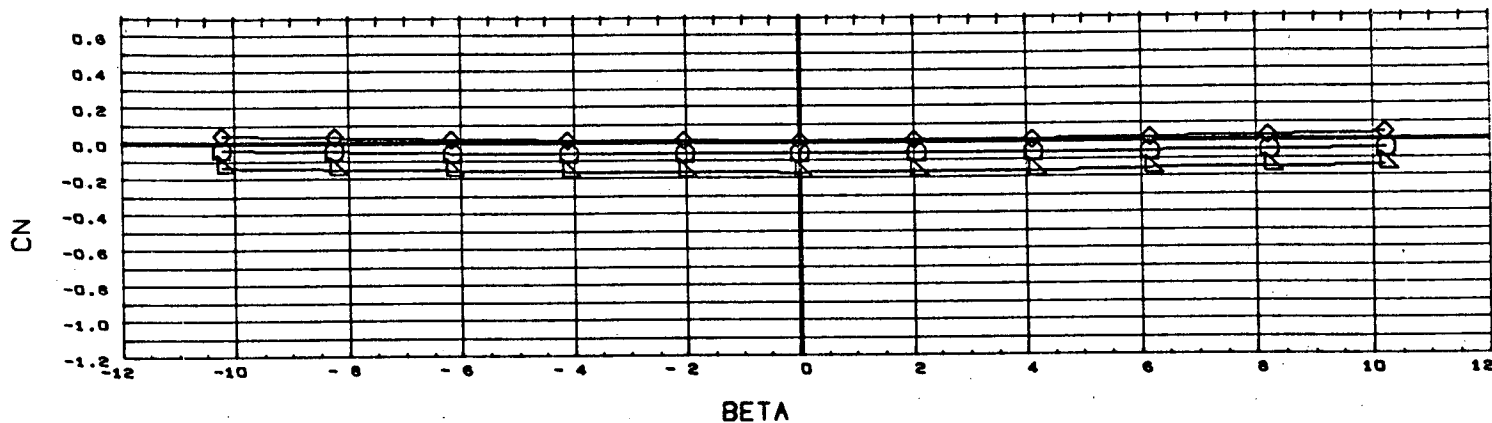
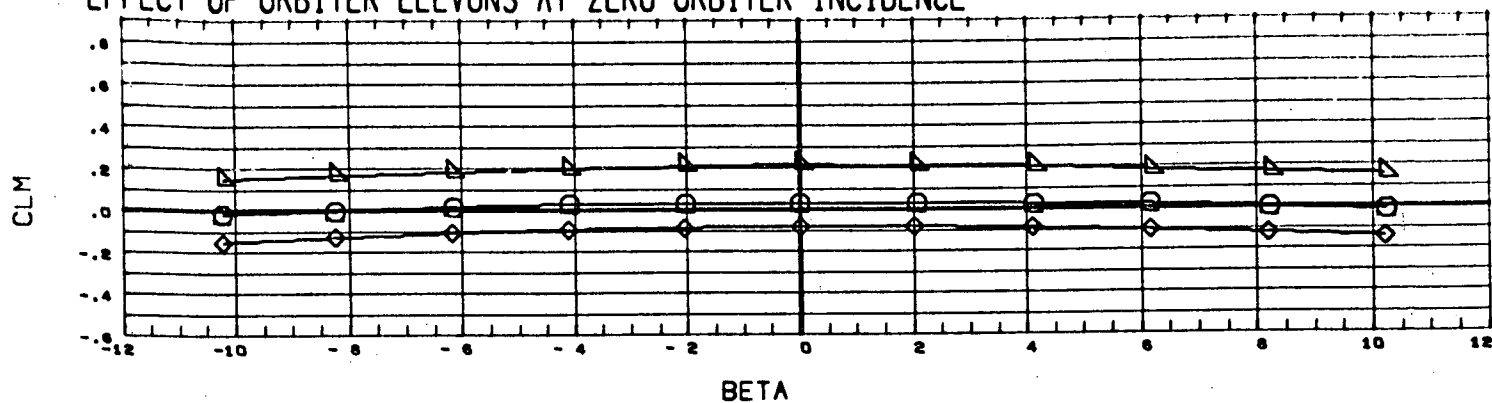


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

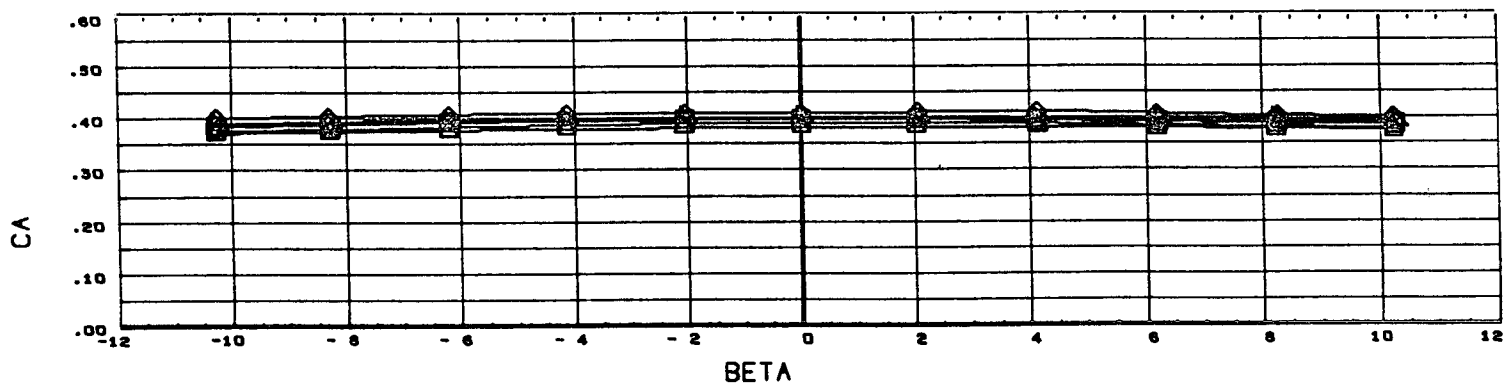
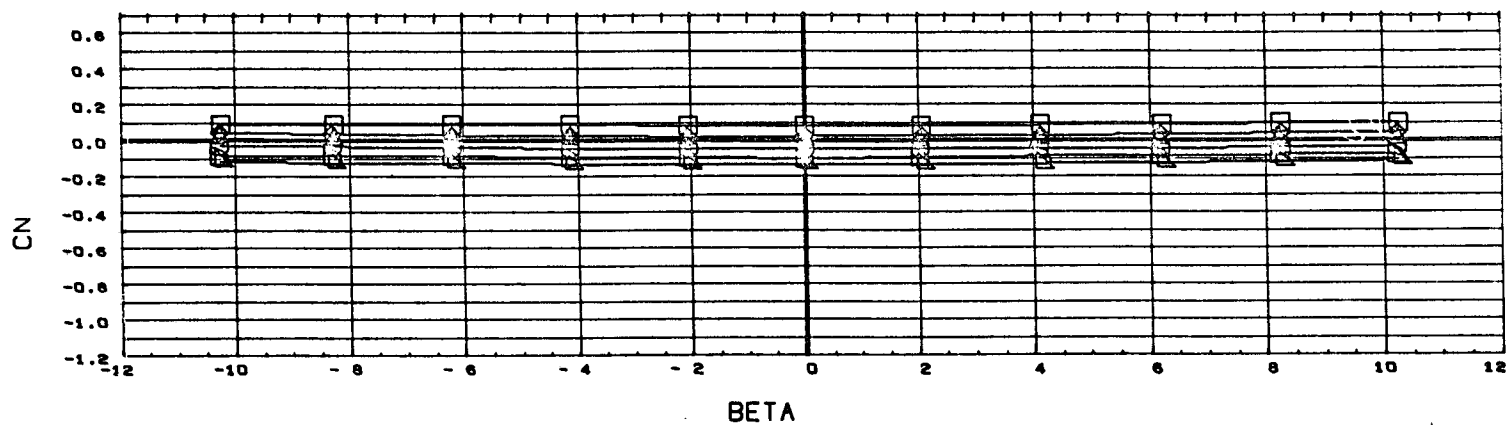
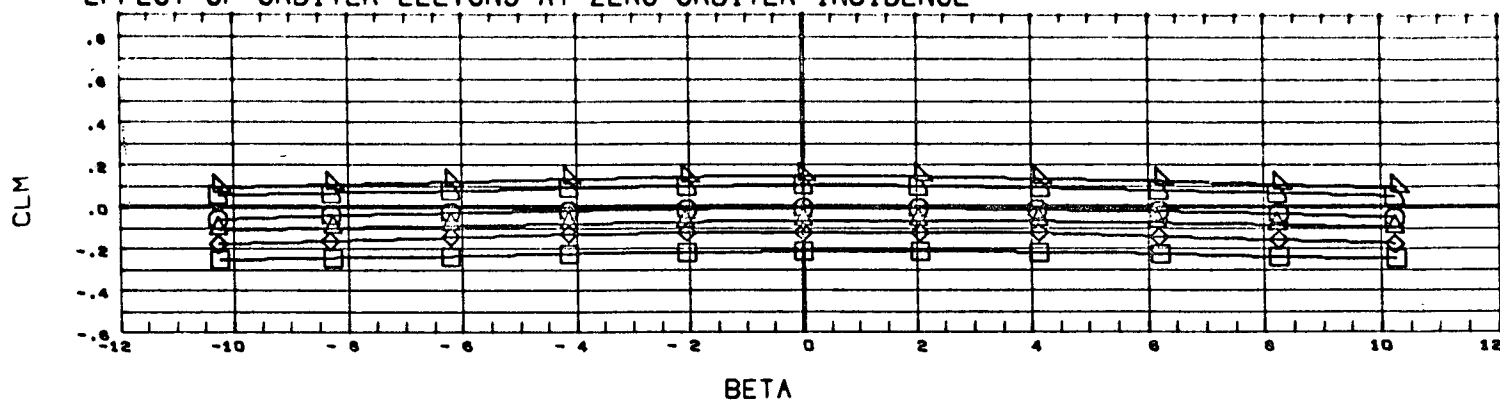


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

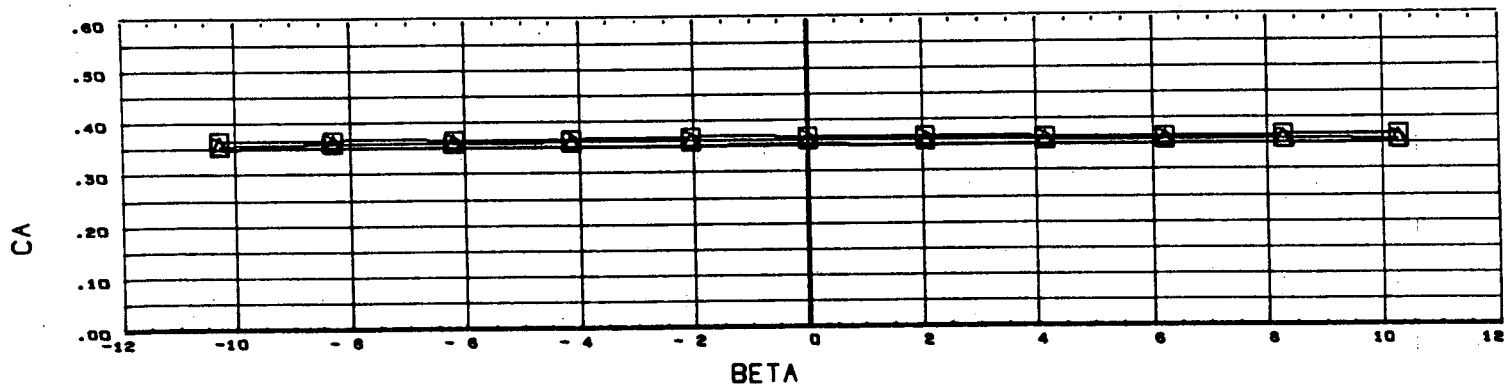
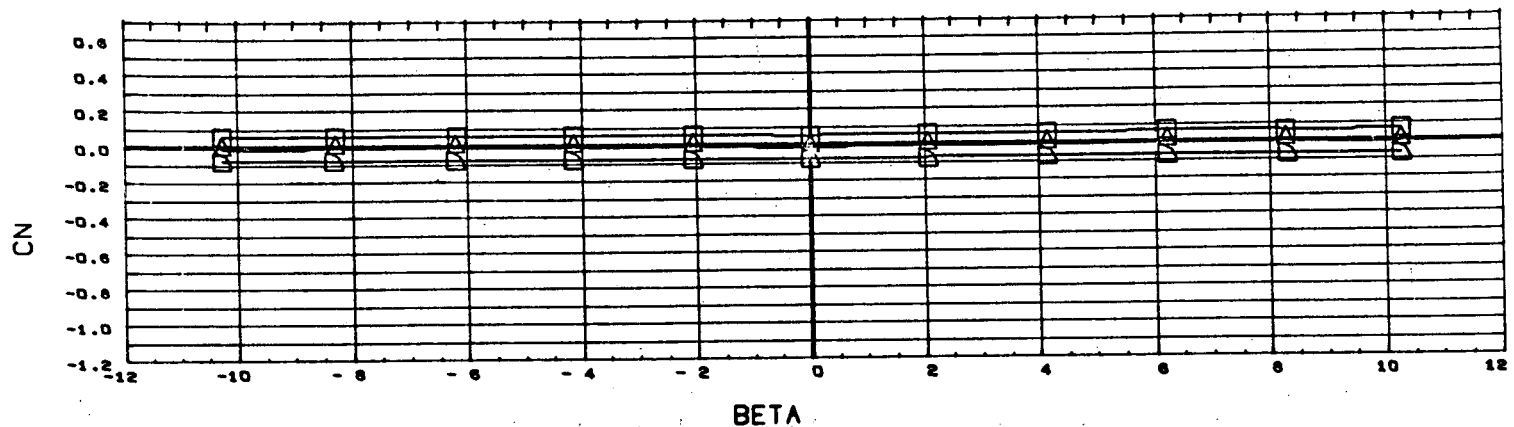
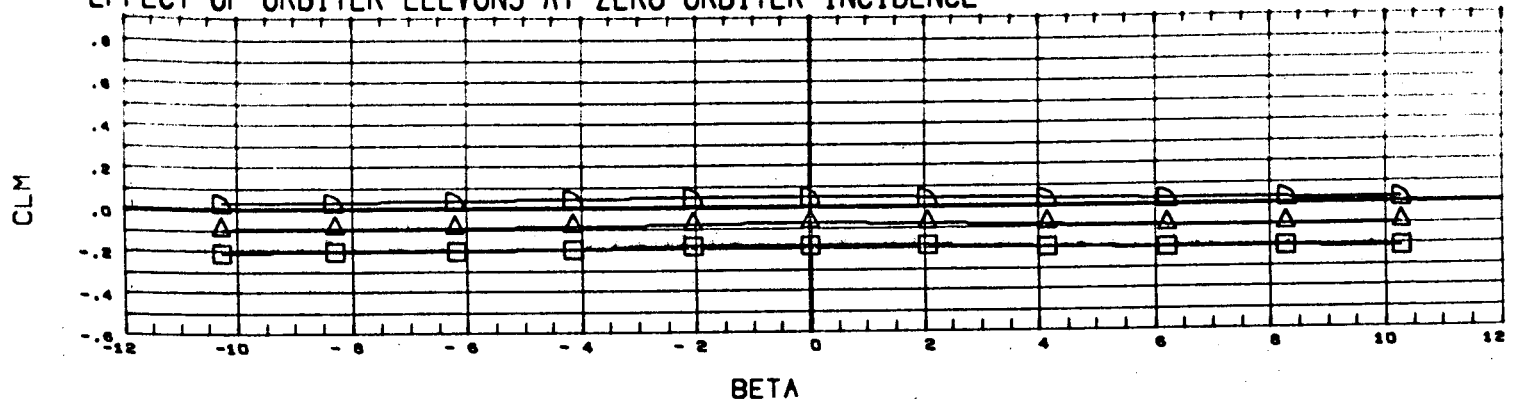


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71098) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

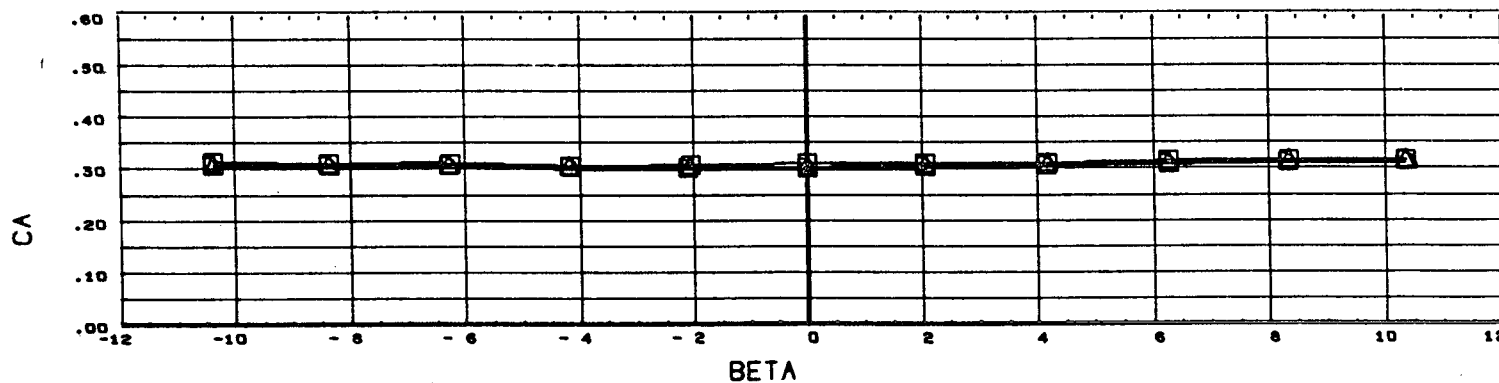
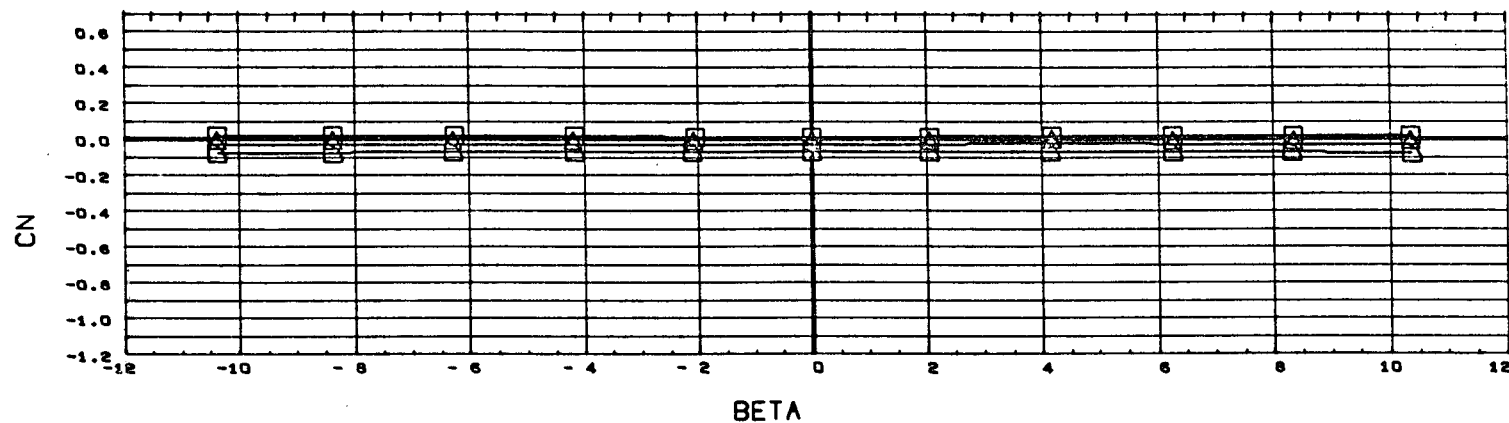
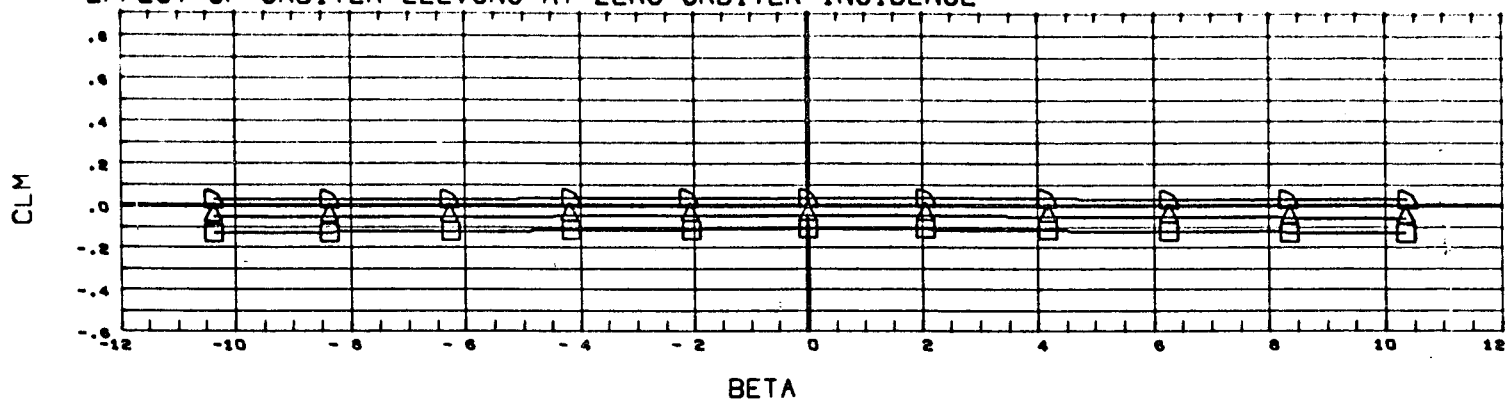


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

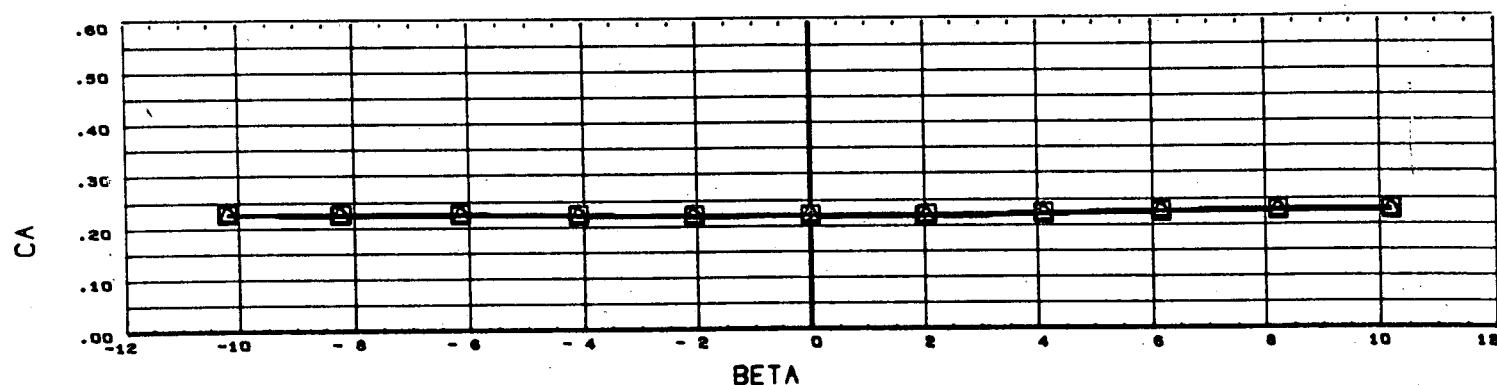
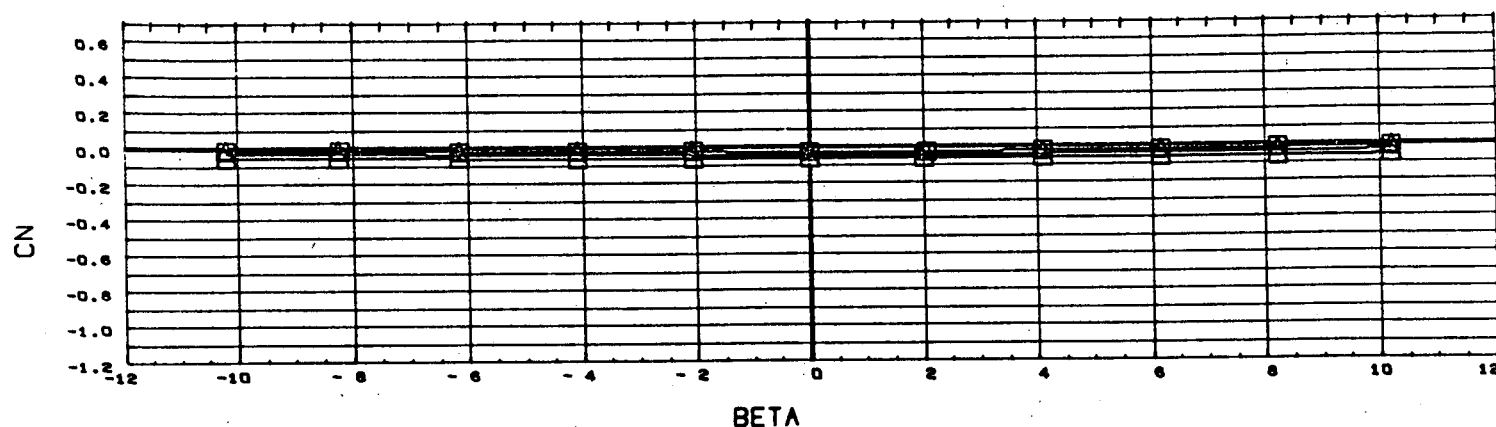
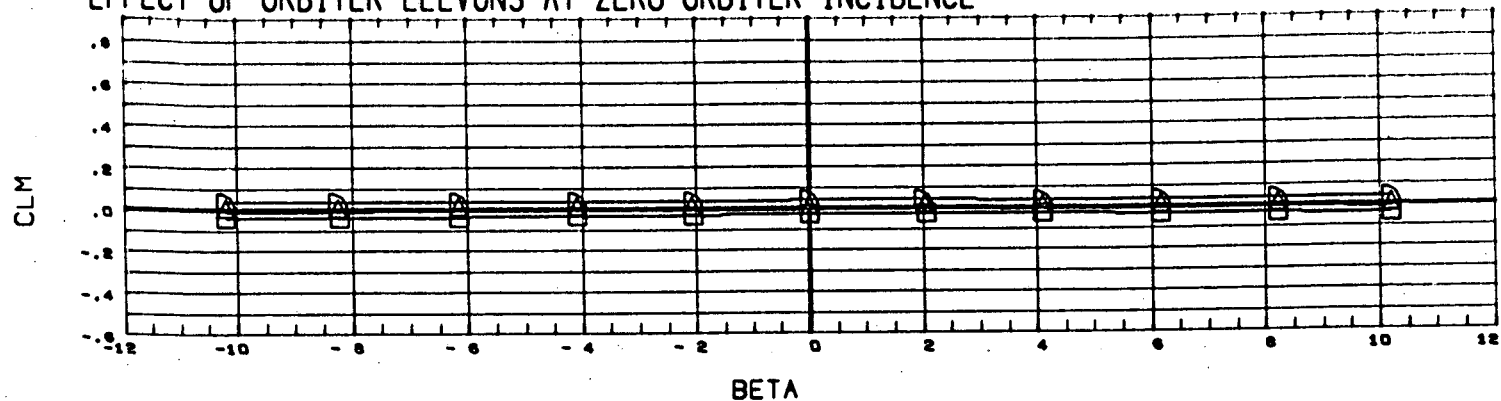


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE

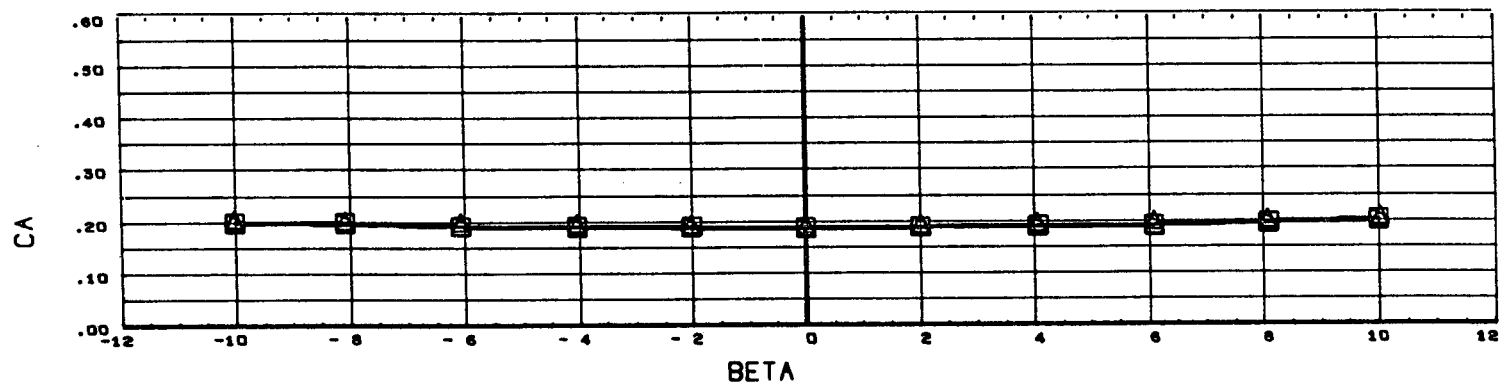
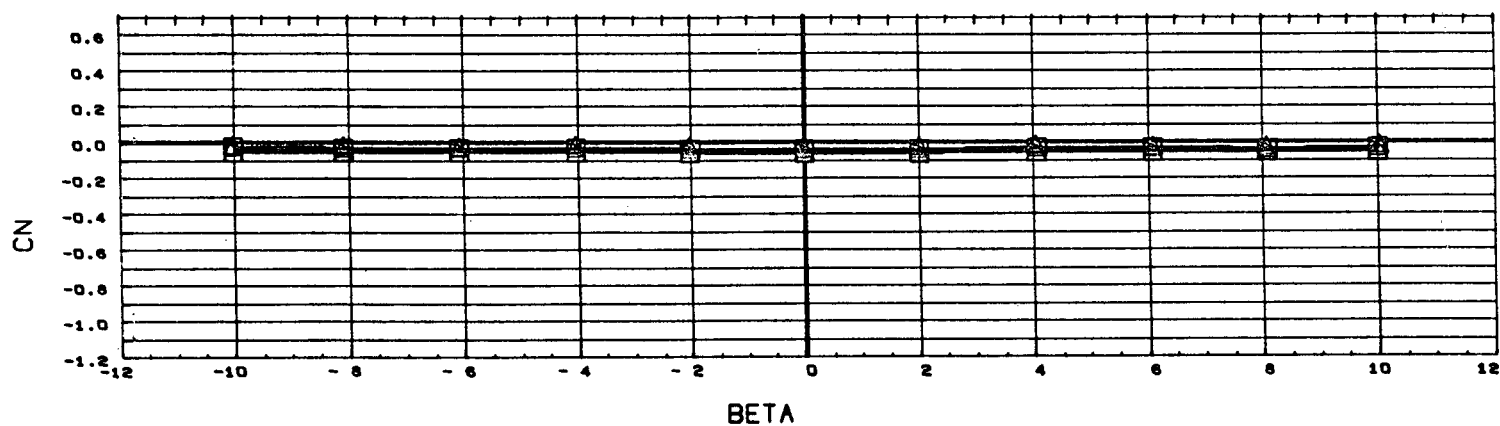
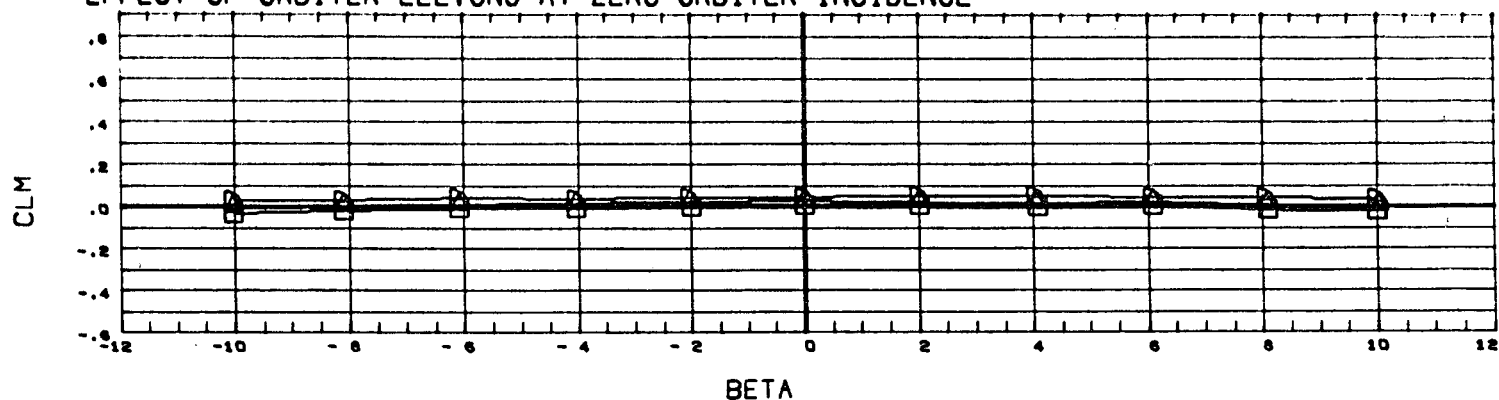


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71098) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER ELEVONS AT ZERO ORBITER INCIDENCE



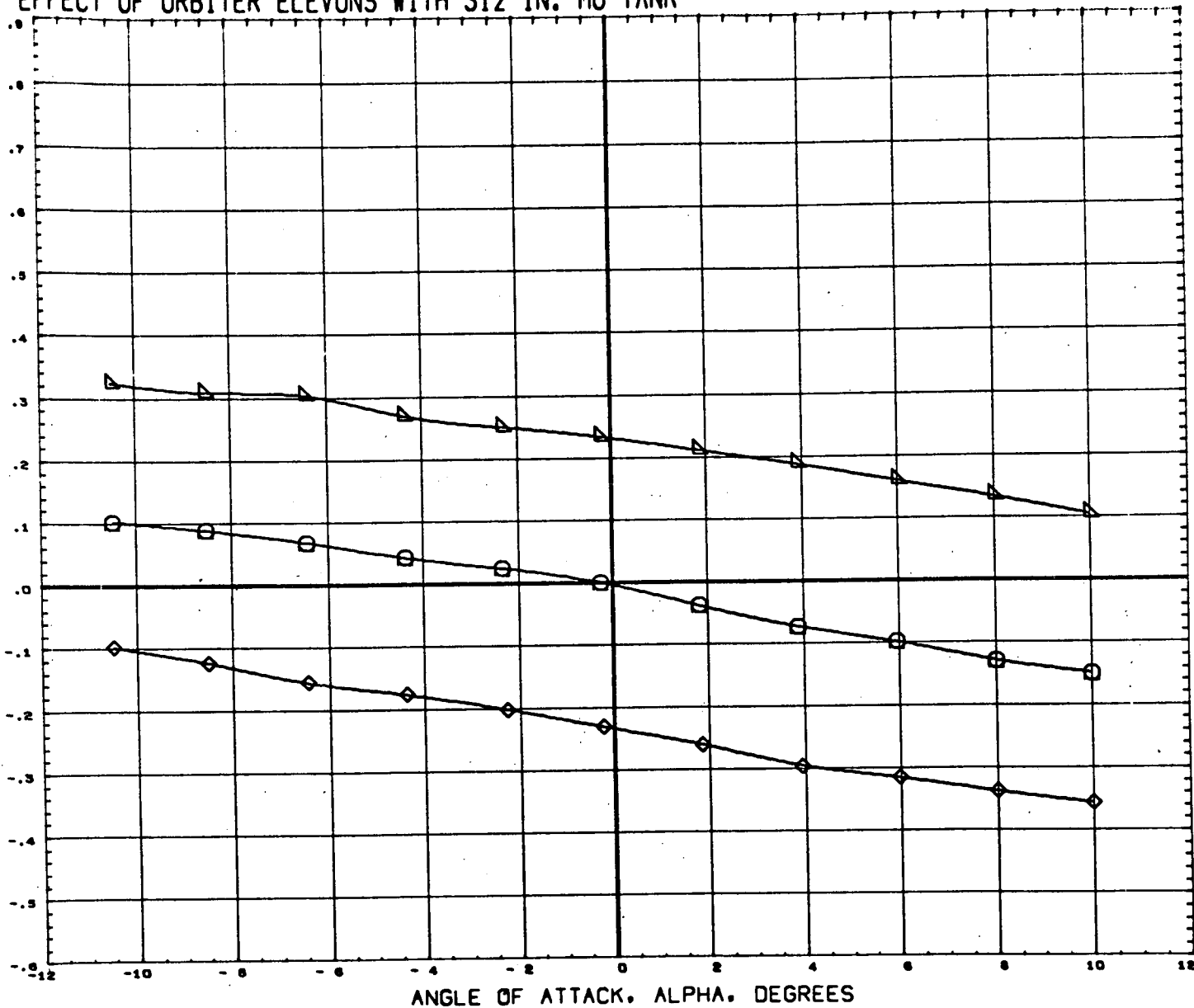
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71098) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71100) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71104) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71102) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

PITCHING MOMENT COEFFICIENT, CLM

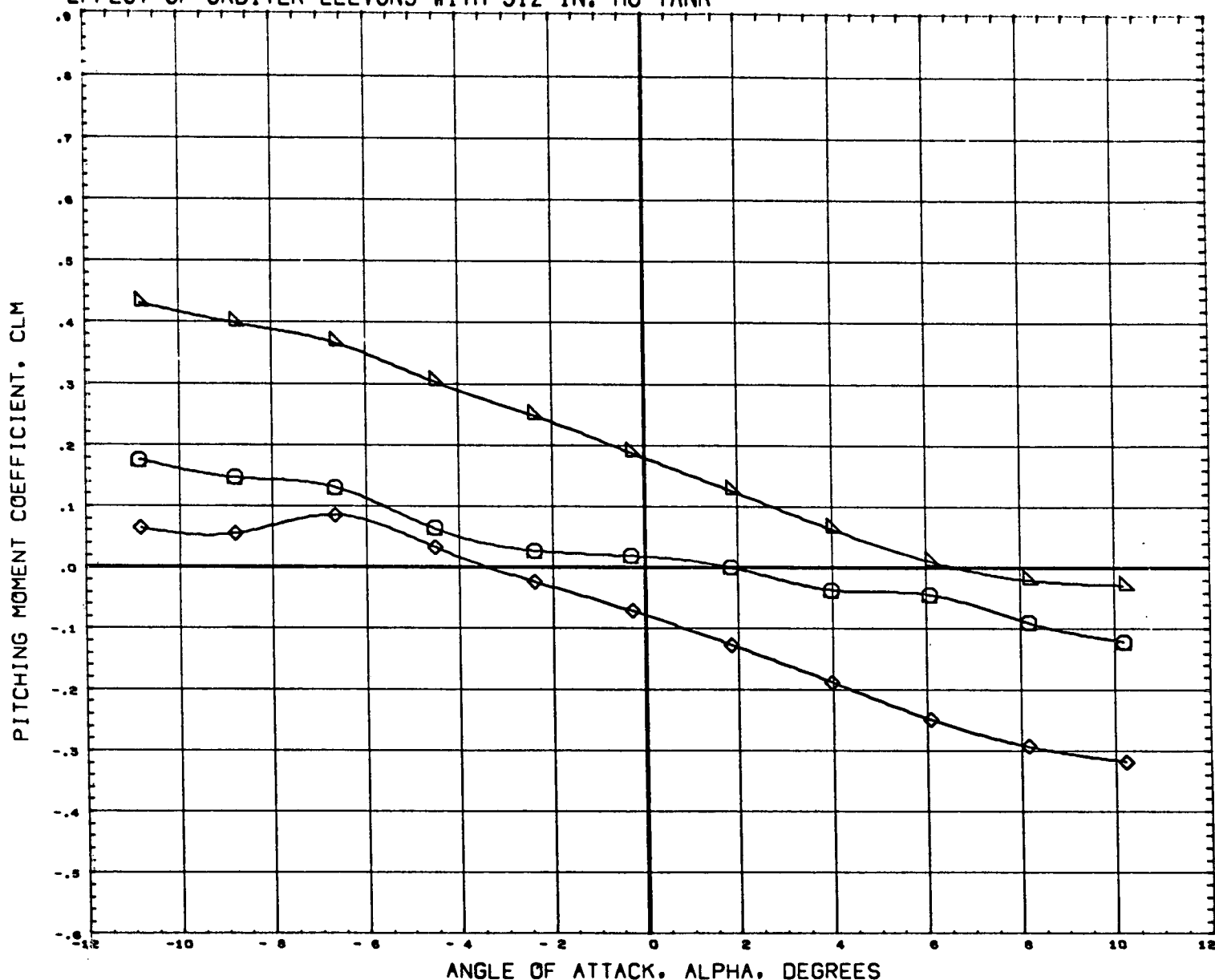


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
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| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMHP | 3.3600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMHP | 0.0000 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMHP | 0.2460 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

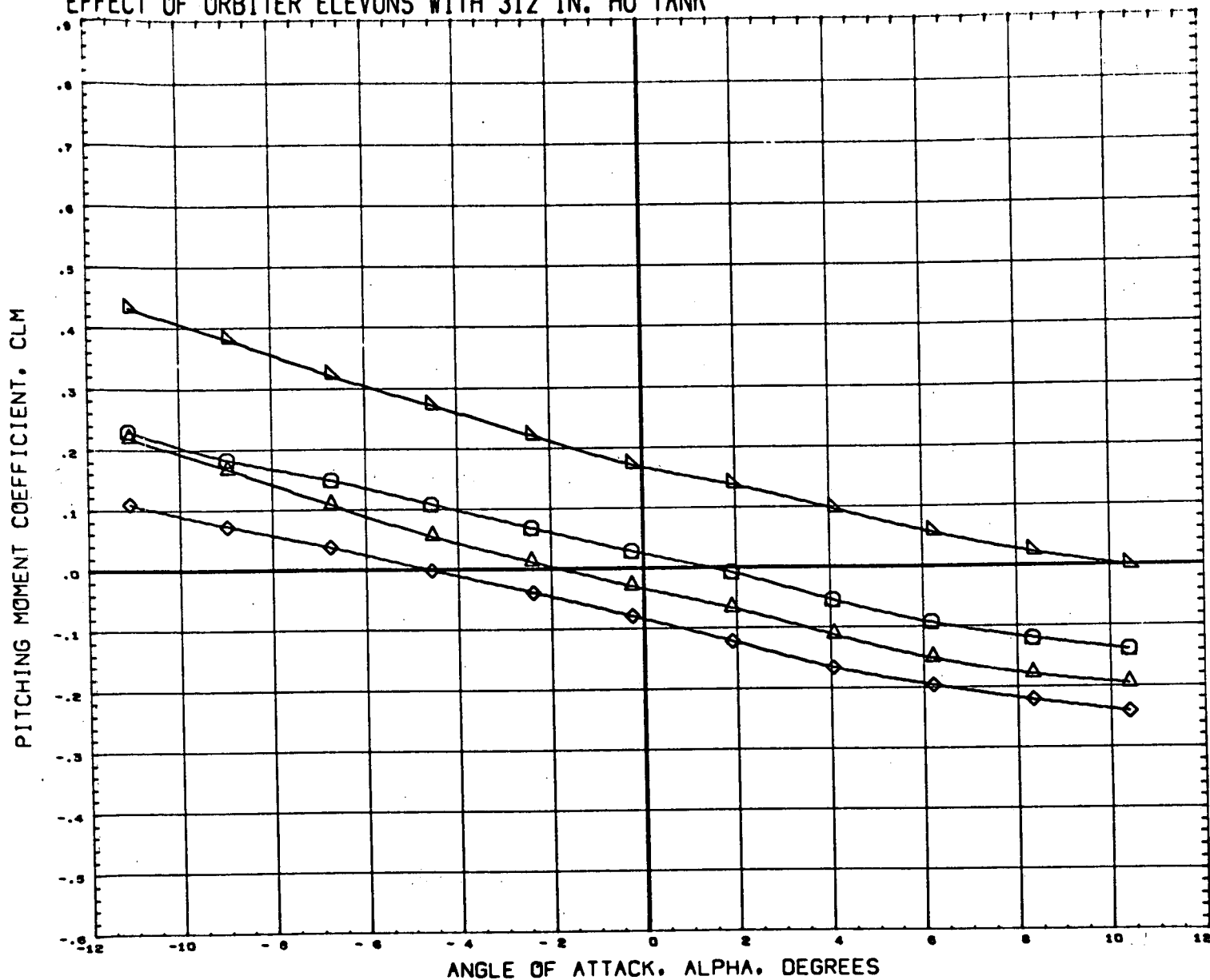


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|---------|-------|---------|--------|-----------------------|--------|---------|
| (D71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 | IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH .90

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

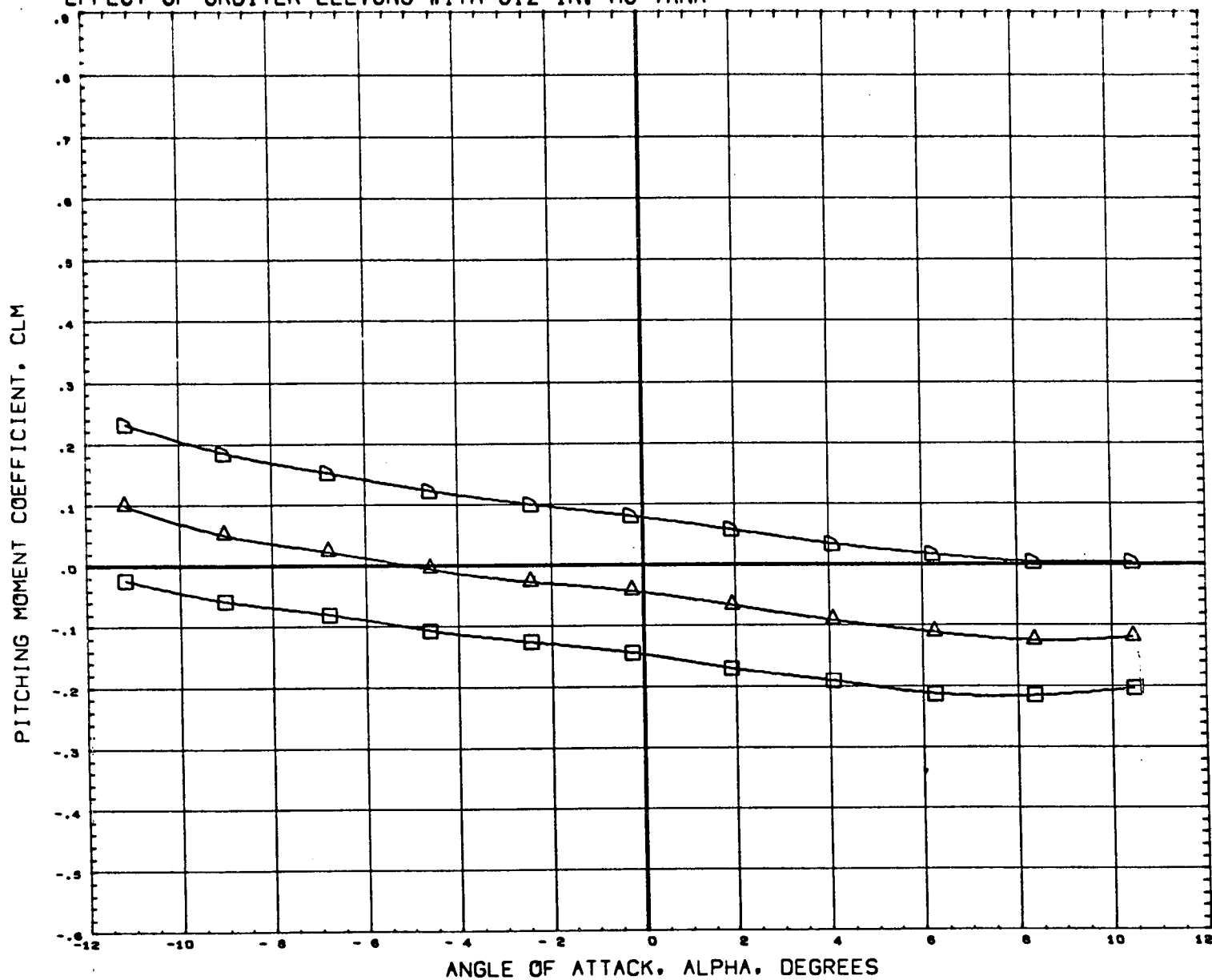


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|---------------|
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| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



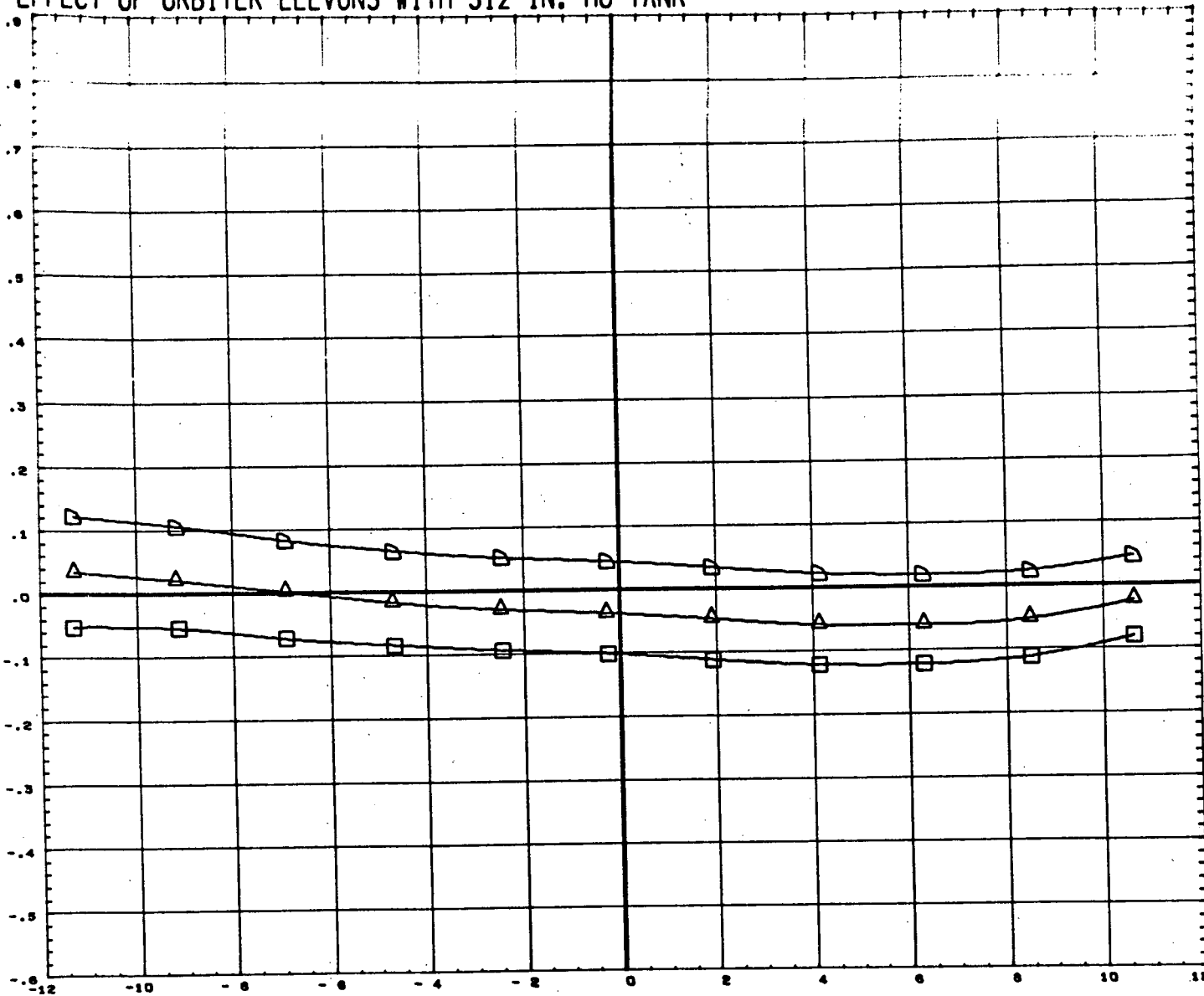
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|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | SREF | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMPP | 3.3600 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMPP | 0.0000 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMPP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

PITCHING MOMENT COEFFICIENT, CLM



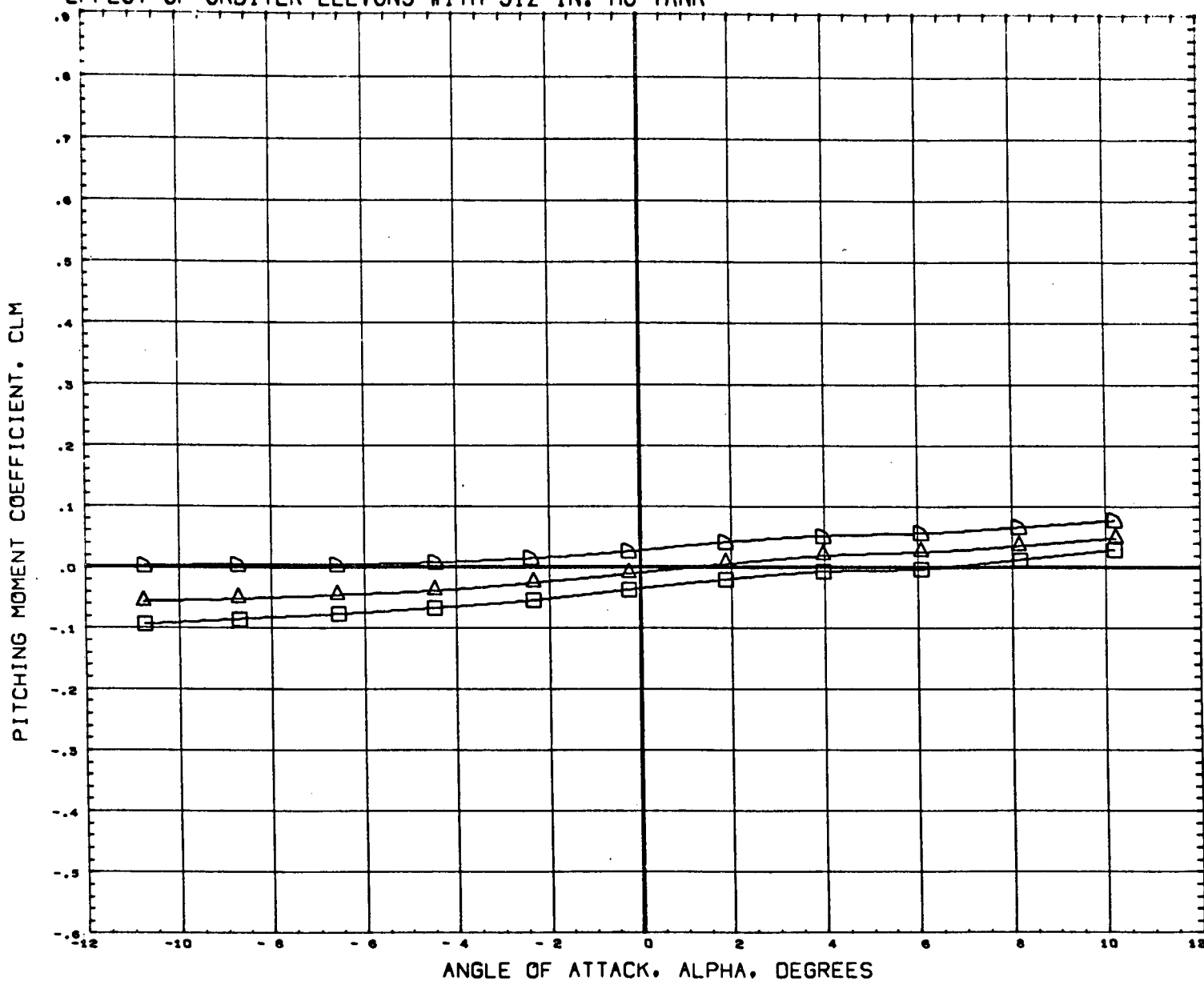
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30. IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

PAGE 367

EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK



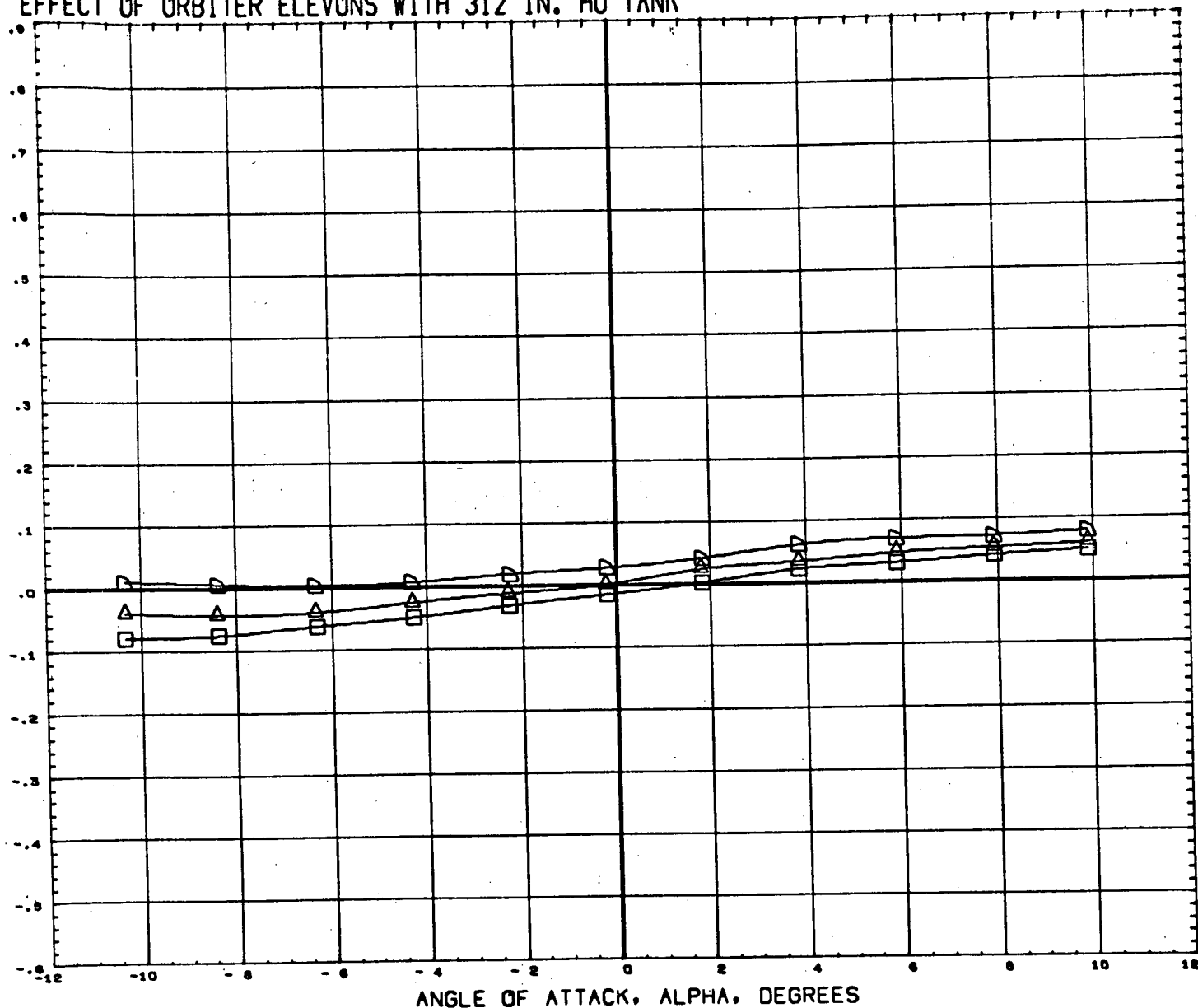
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|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

PITCHING MOMENT COEFFICIENT, CLM



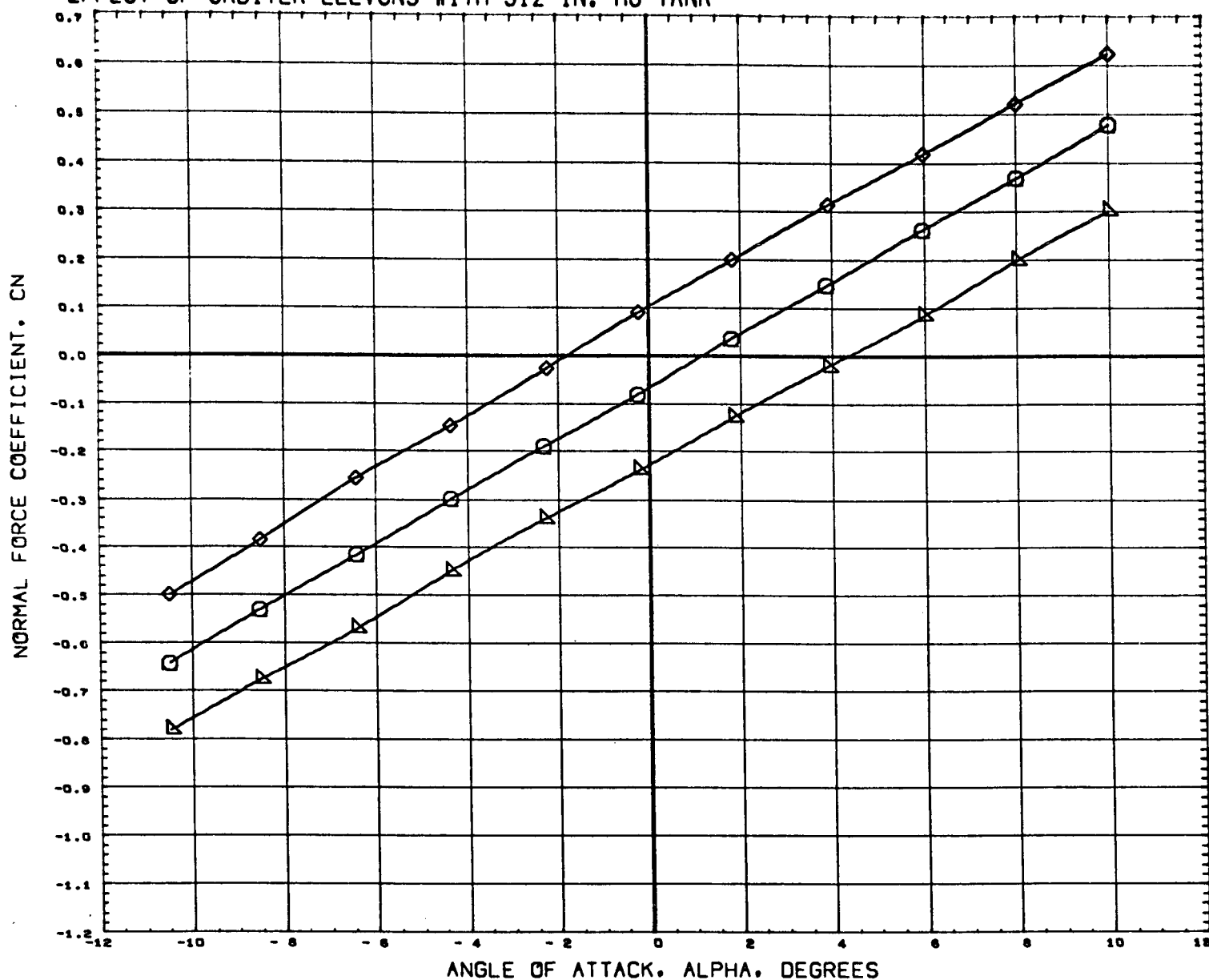
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| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ.IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

4.96

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

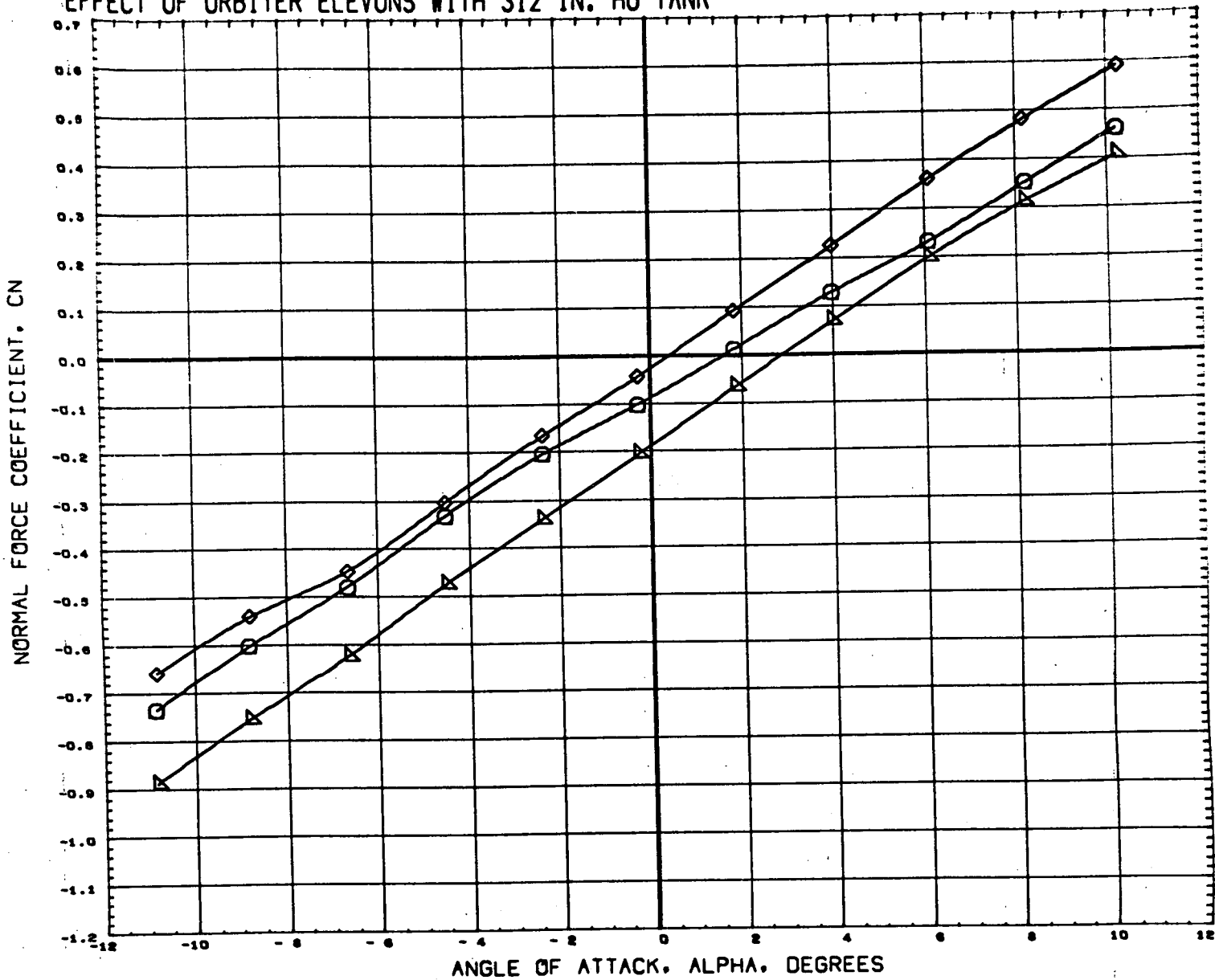


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| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 30. IN. |
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| (071143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 370

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

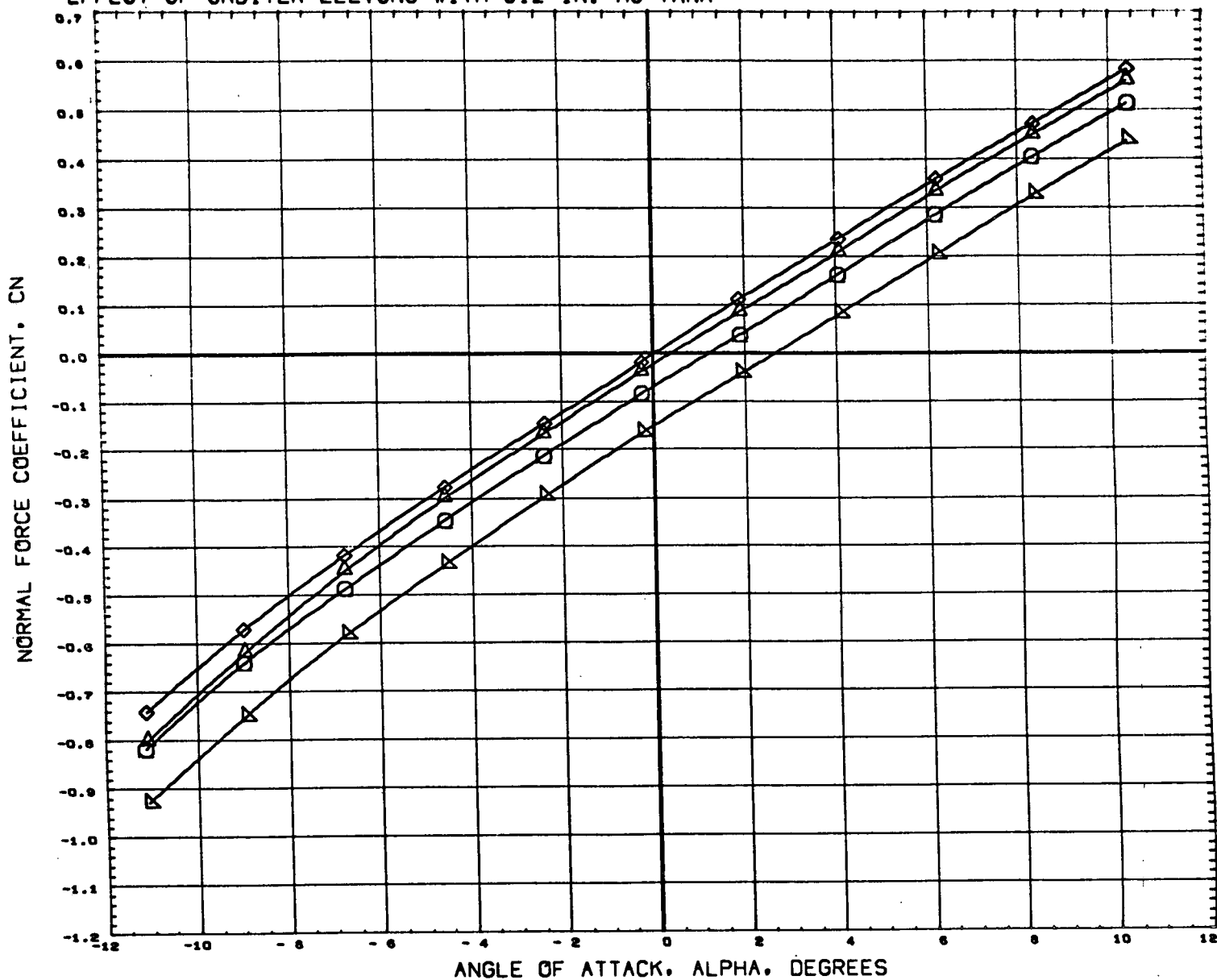


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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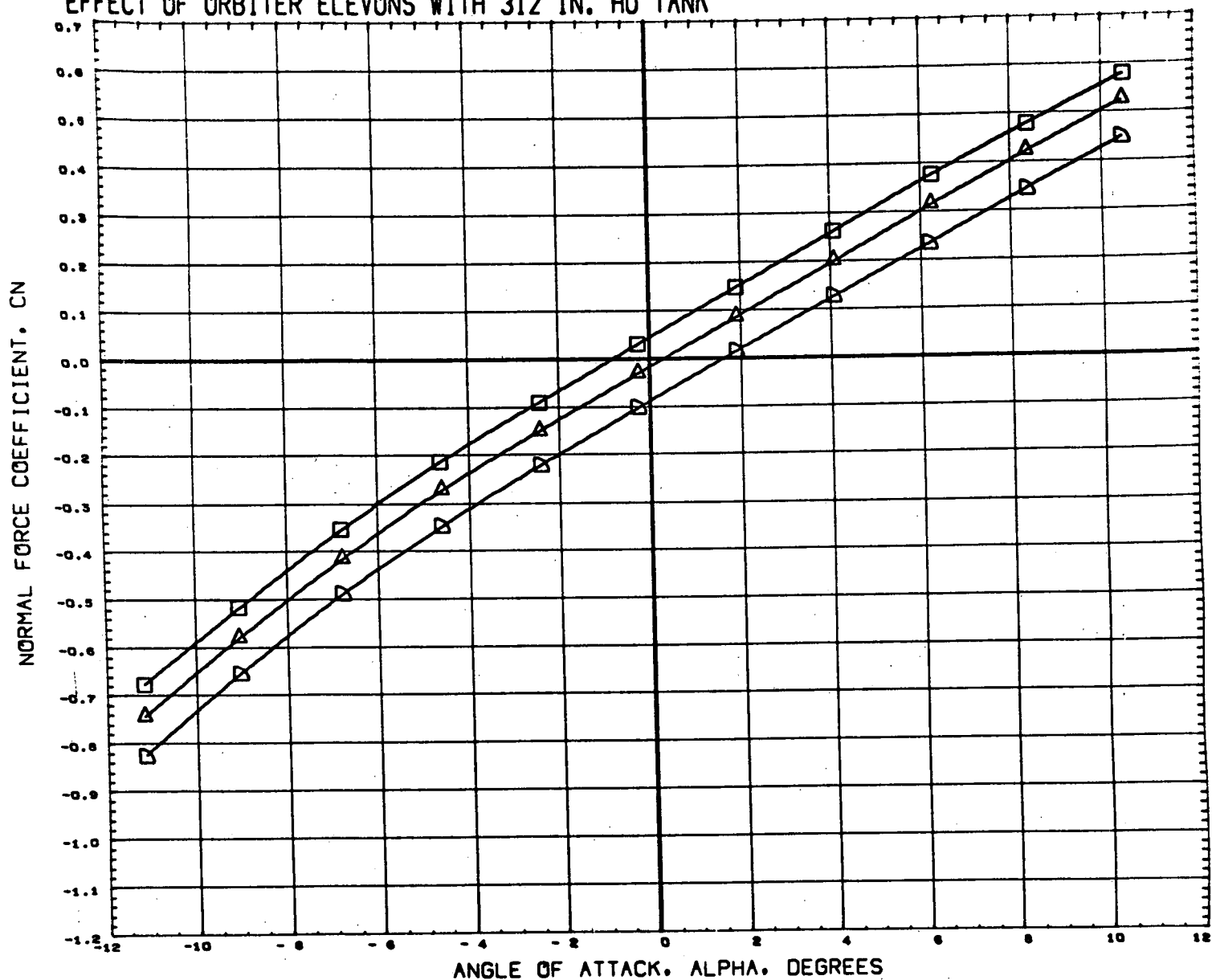
EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (871135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

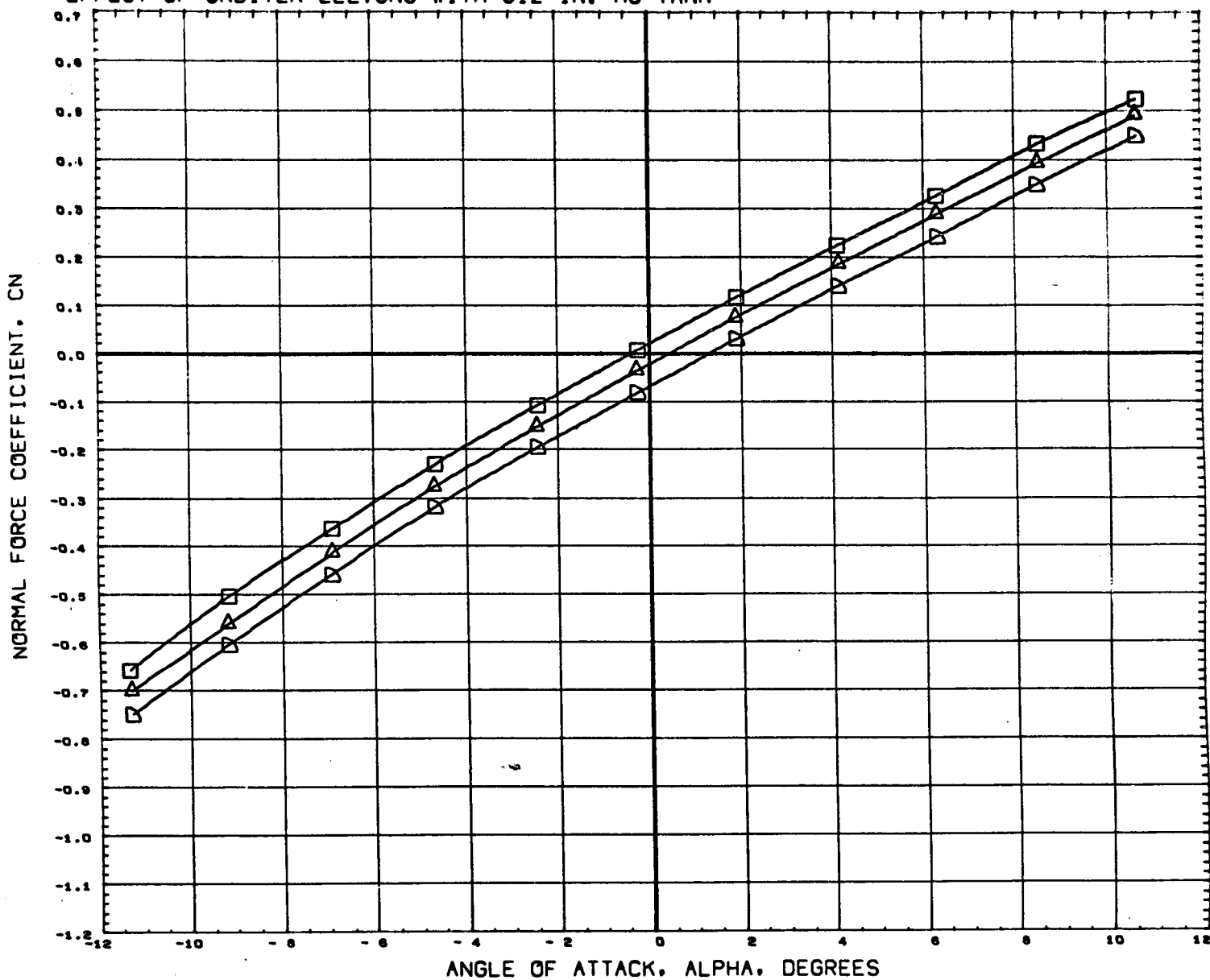


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|---------------|
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| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREP | 4.4600 1N. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMHP | 3.3600 1N. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMHP | 0.0000 1N. |
| (071145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMHP | 0.2480 1N. |
| (071147) | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

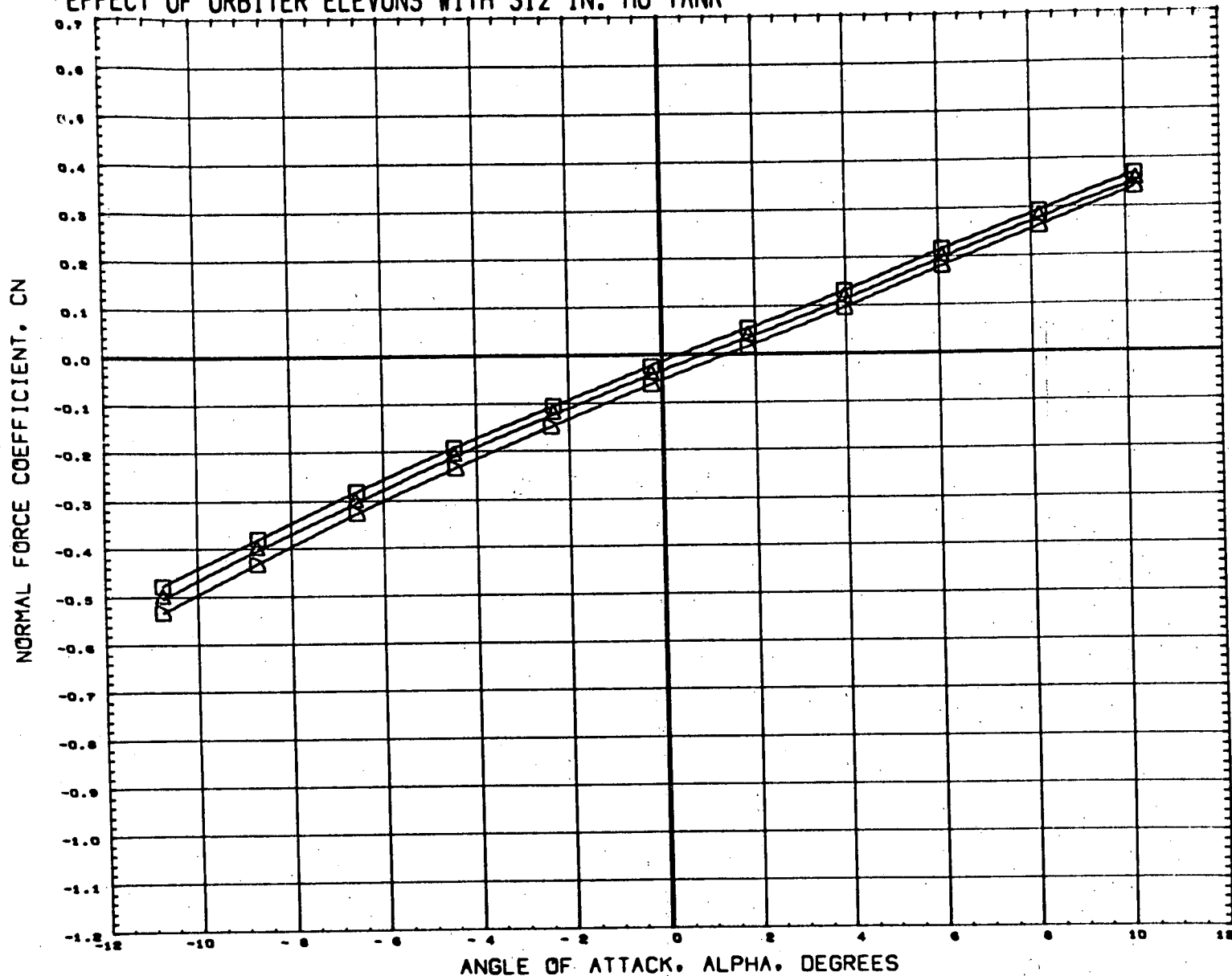


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | SREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



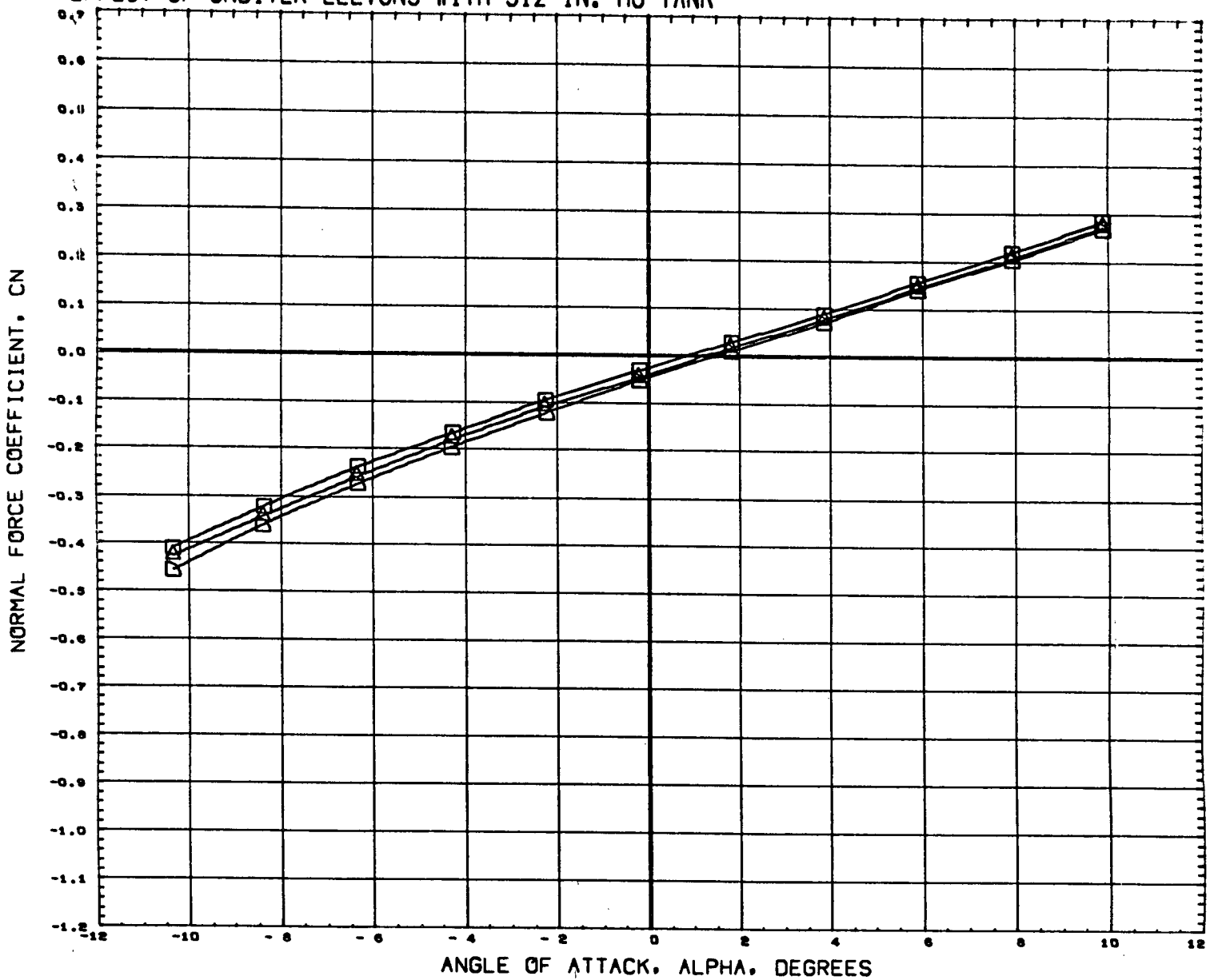
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| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | SREP | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

3.48

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

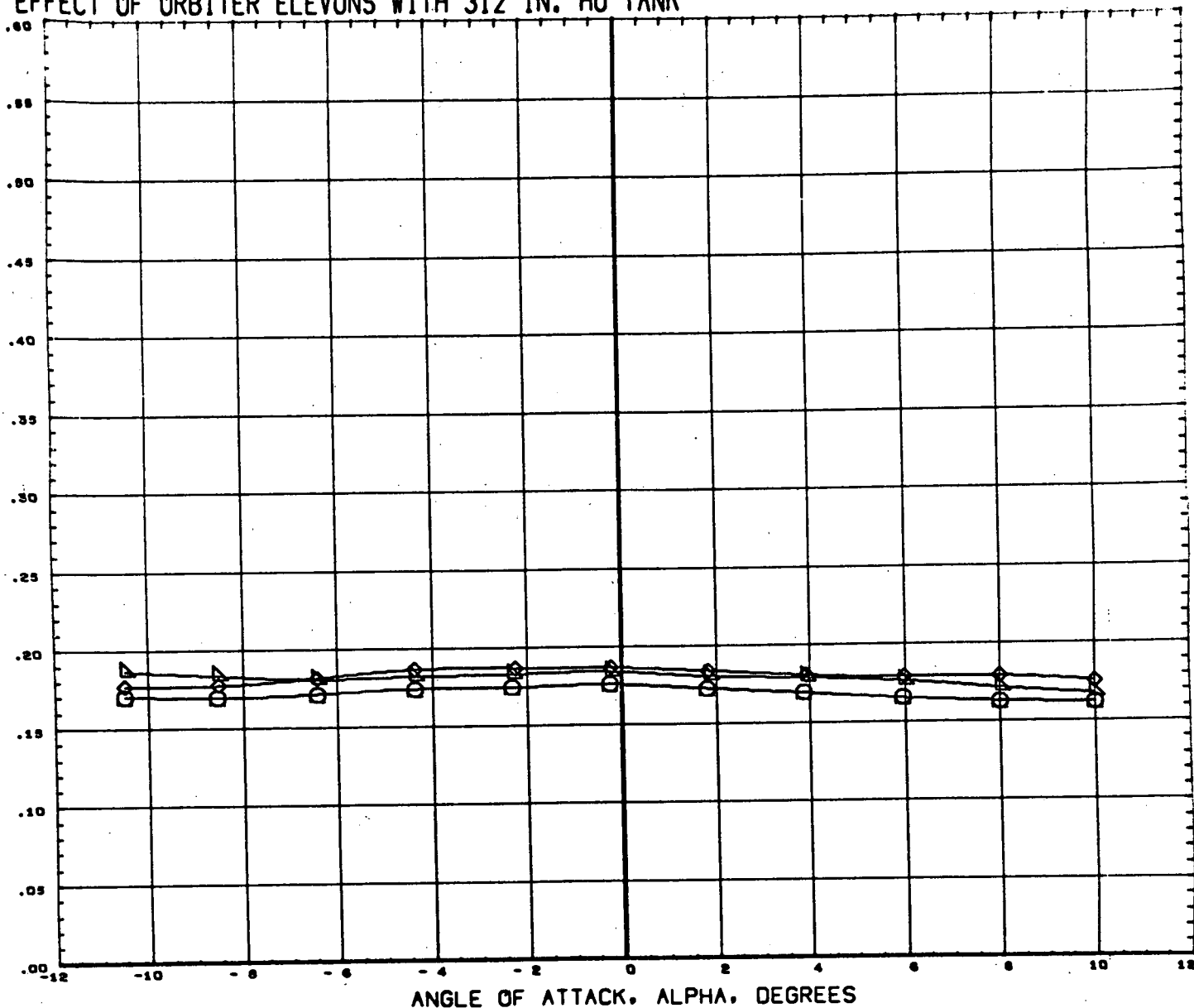


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|---------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

AXIAL FORCE COEFFICIENT, C_A

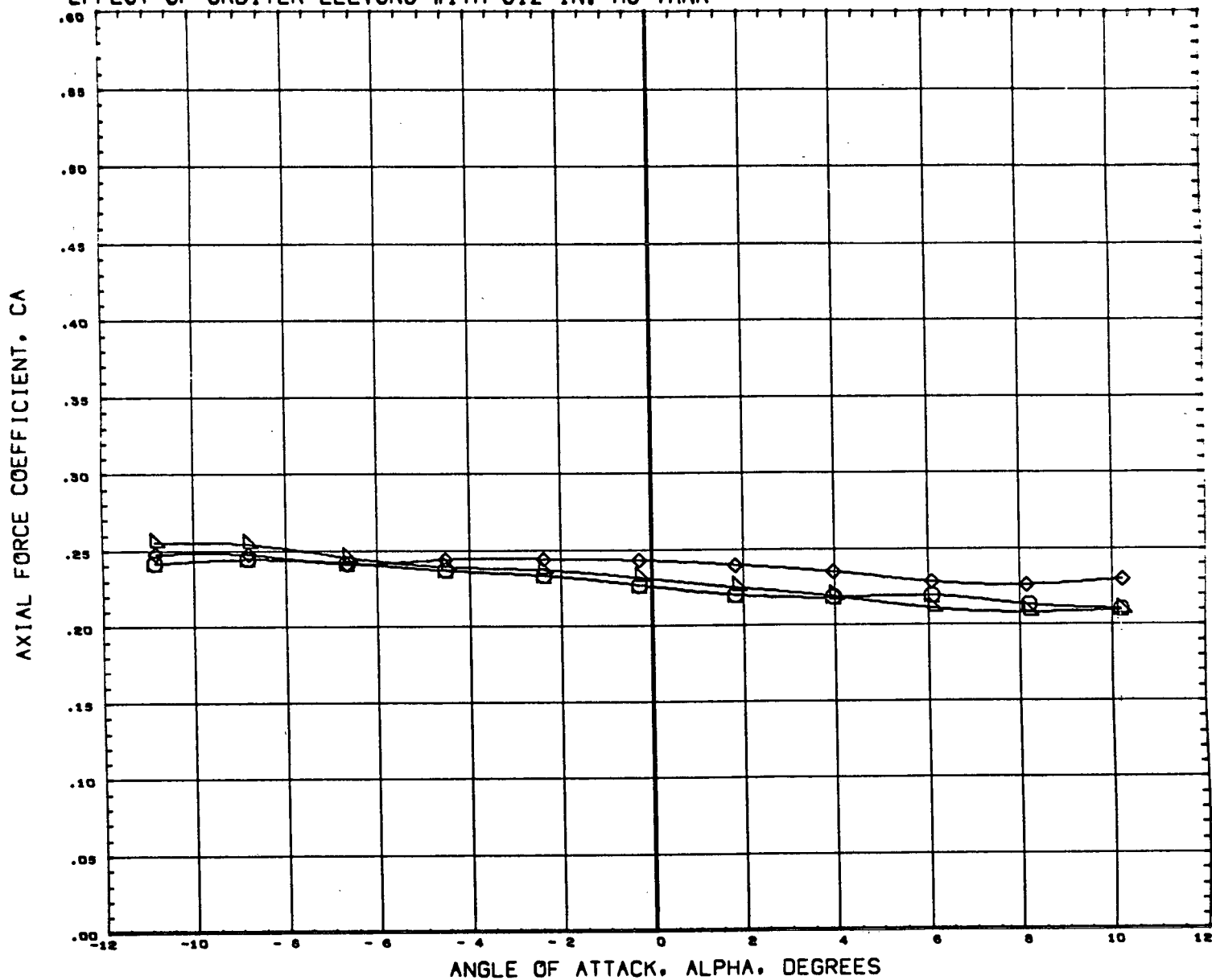


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| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| (071147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | | 0.000 | 0.023 | -10.000 | 0.000 | SCALE | 0.0040 SCALE |

MACH .60

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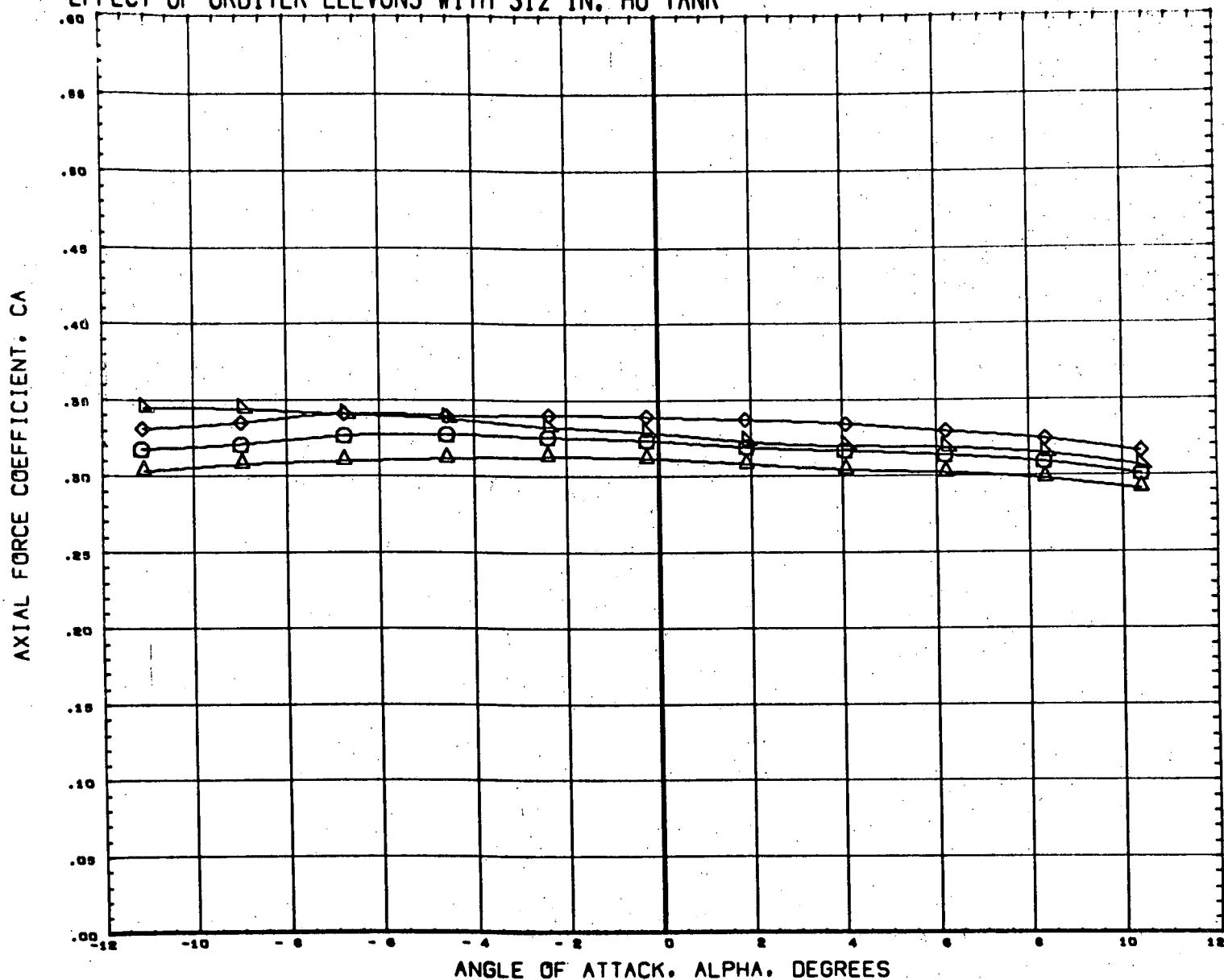
EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
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| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0250 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP 3.3600 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP 0.0000 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH .90

EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

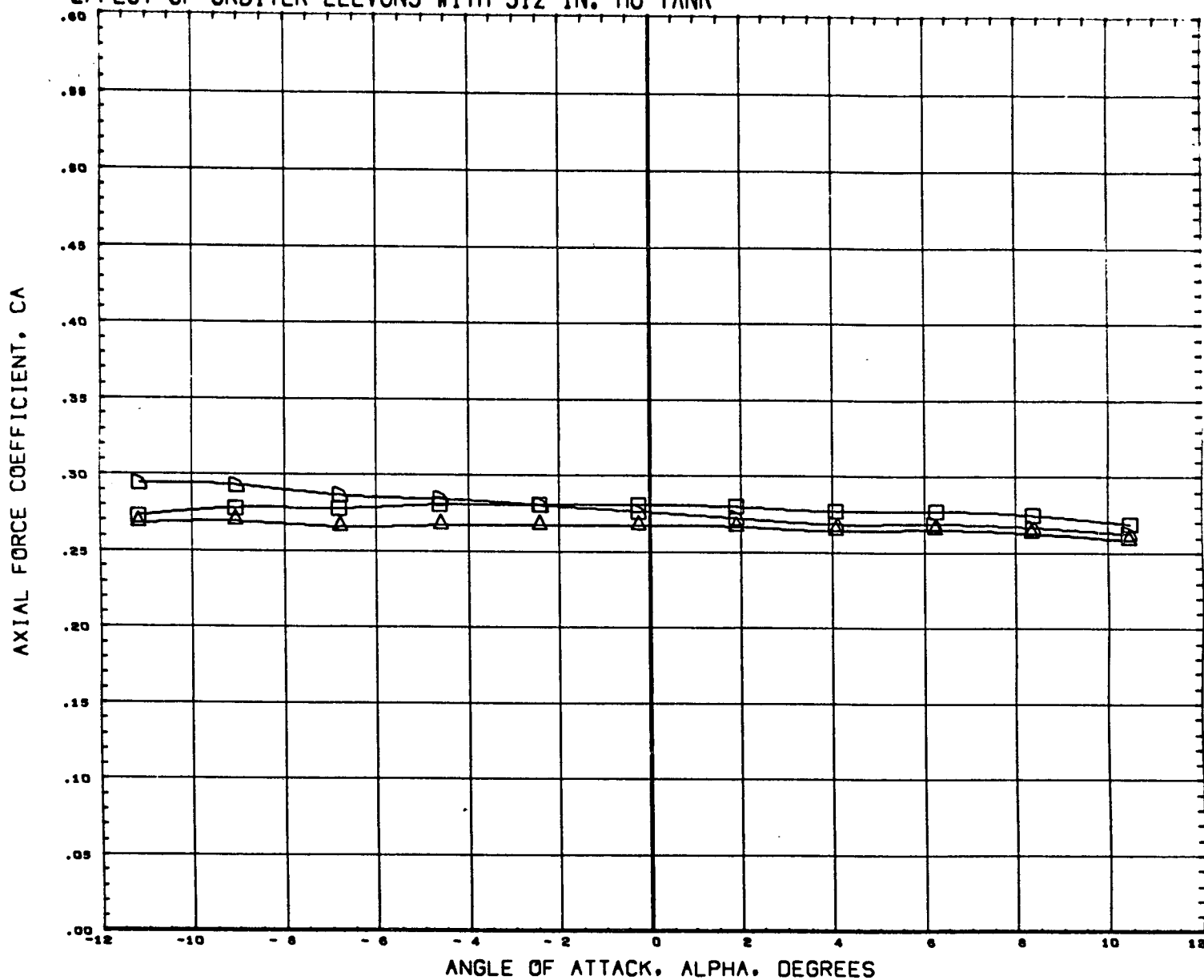


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.025 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90151 | 0.000 | 0.025 | 10.000 | 0.000 | BRFP | 4.4600 IN. |
| (071141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 10.000 | 0.000 | YMRP | 3.3600 IN. |
| (071145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90151 | 0.000 | 0.025 | -10.000 | 0.000 | ZMRP | 0.0000 IN. |
| (071147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | -10.000 | 0.000 | YMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

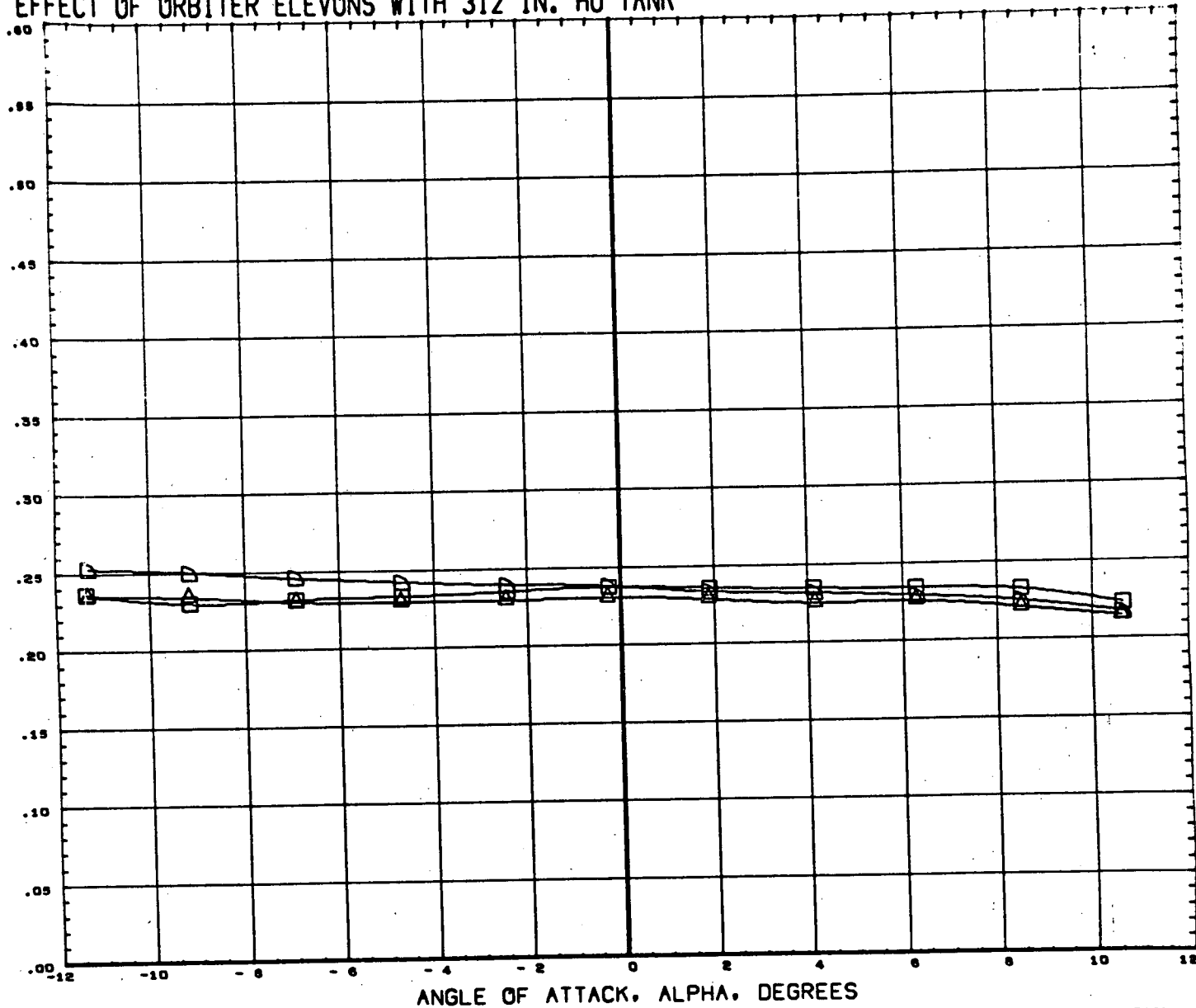
MACH

1.46

PAGE 380

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

AXIAL FORCE COEFFICIENT, C_A

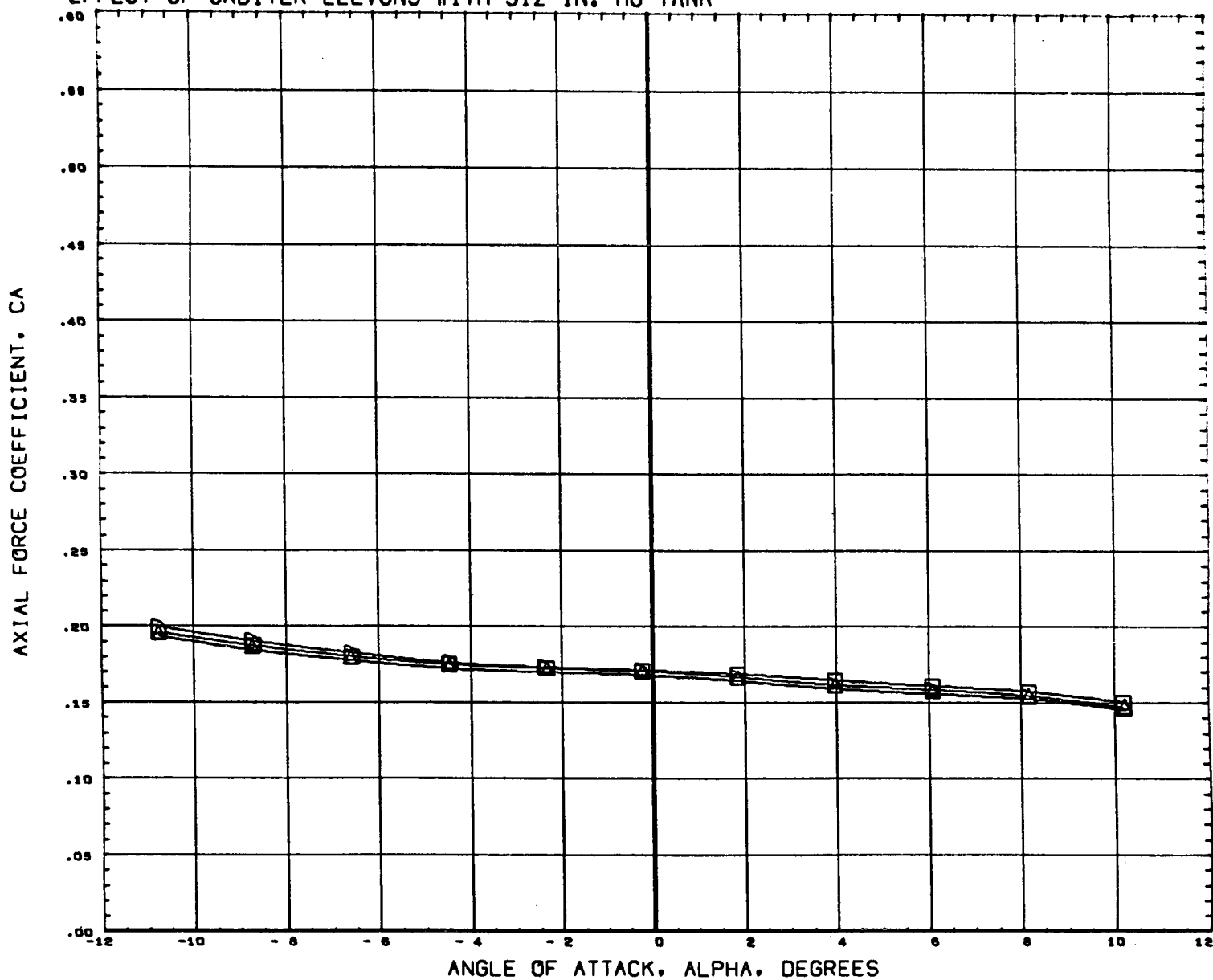


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

PAGE 381

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



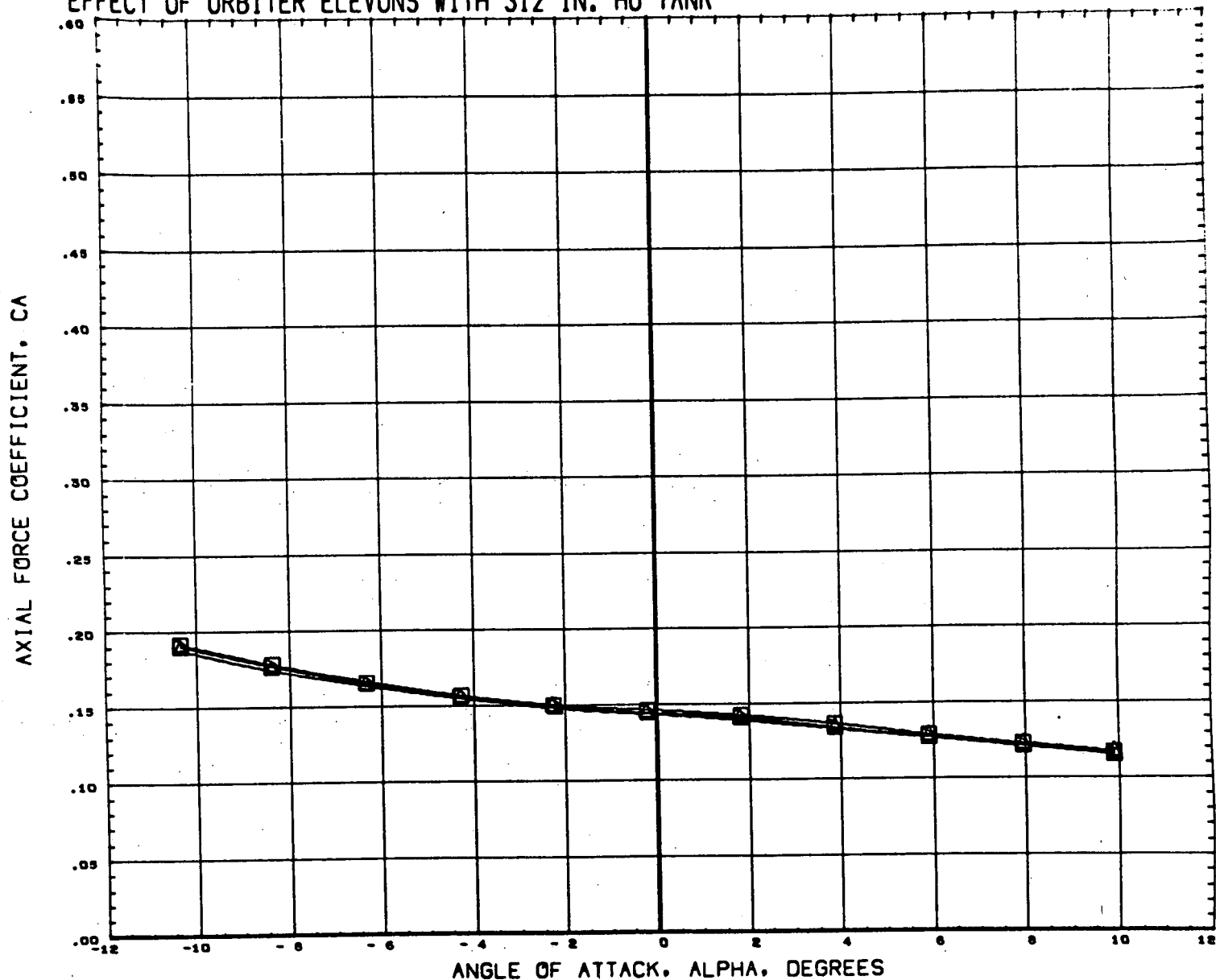
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

3.48

PAGE 382

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

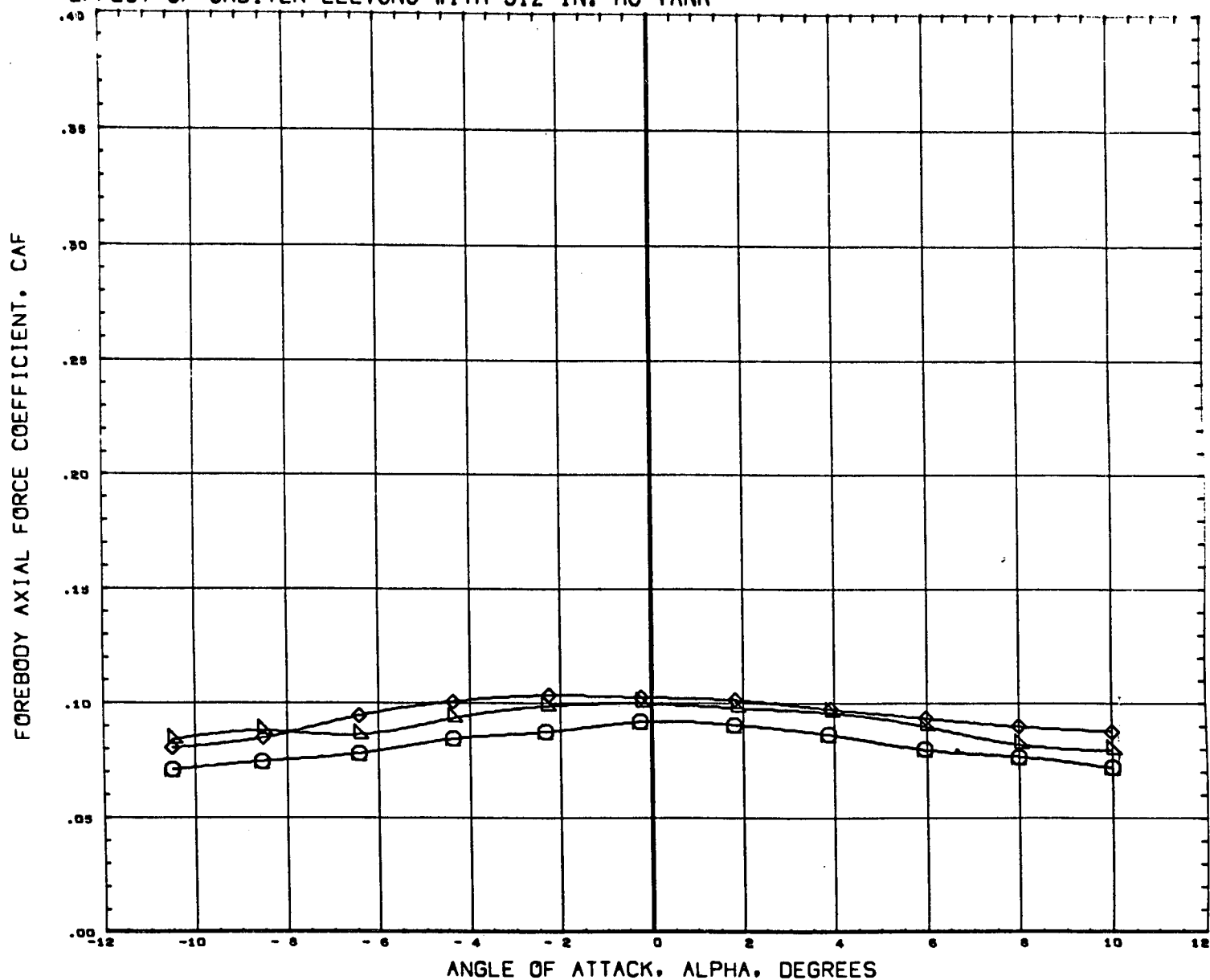


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XHRP | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YHRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

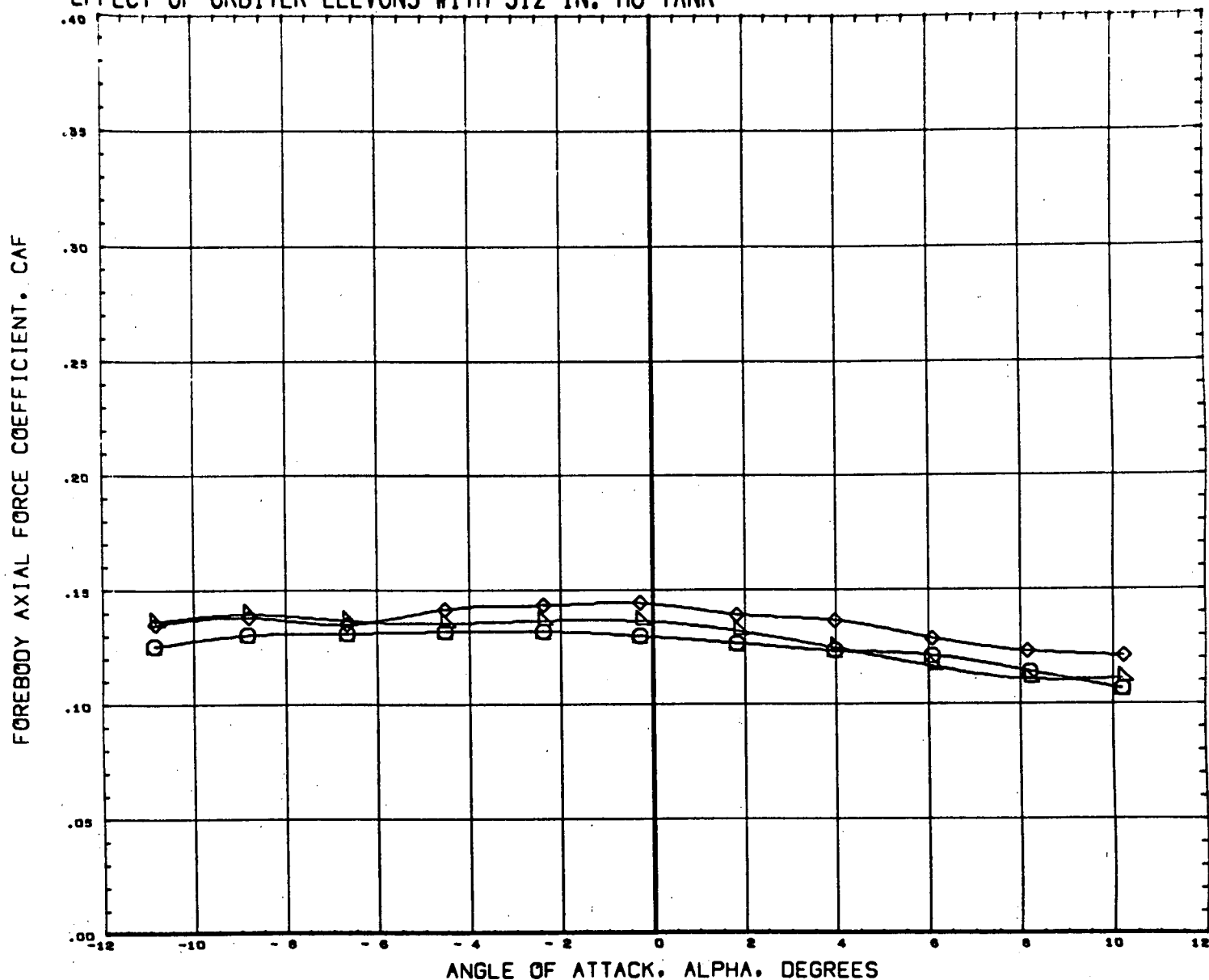


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

PAGE 384

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

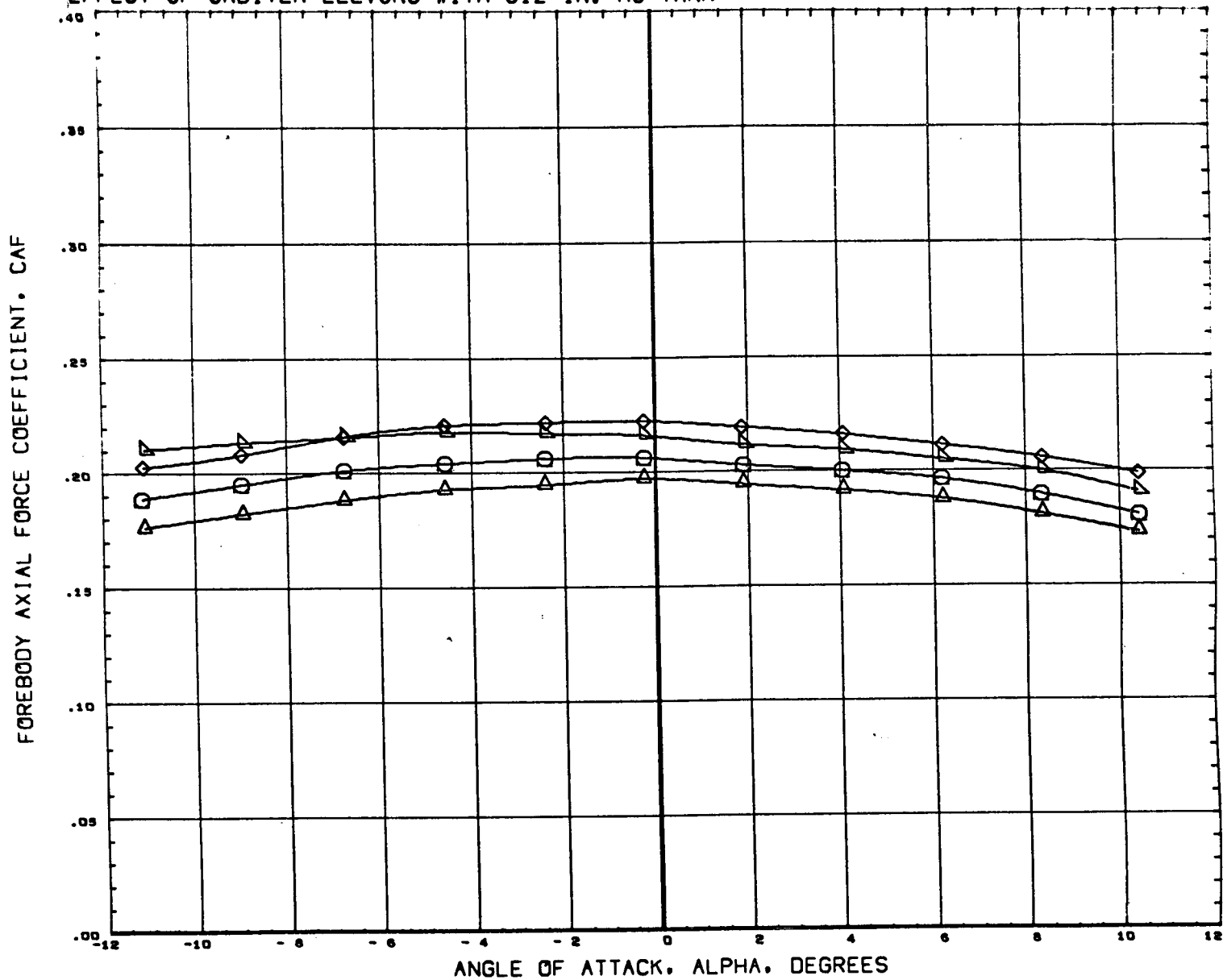


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (D71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

PAGE 385

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

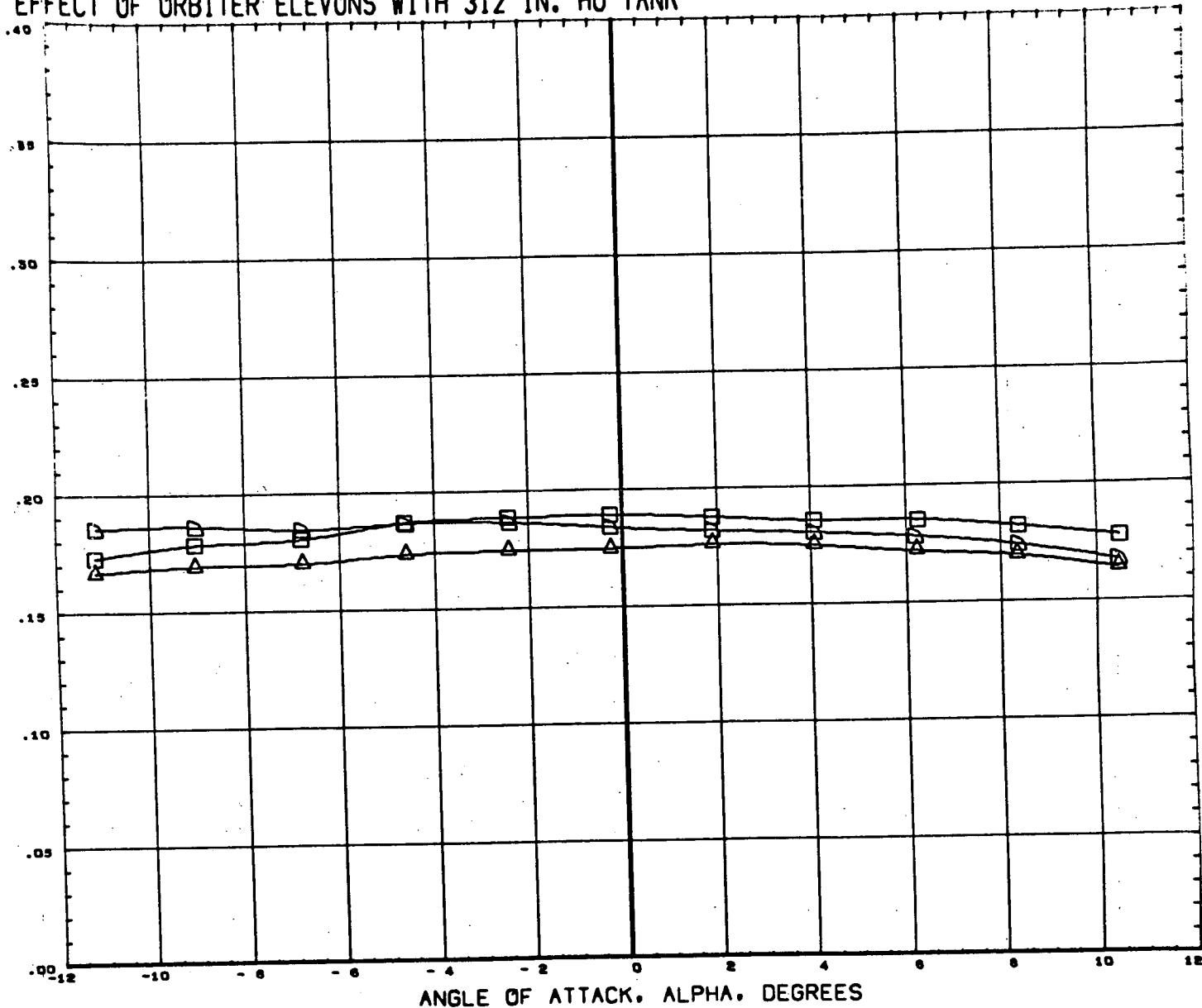


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (D71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

FOREBODY AXIAL FORCE COEFFICIENT, C_{AF}



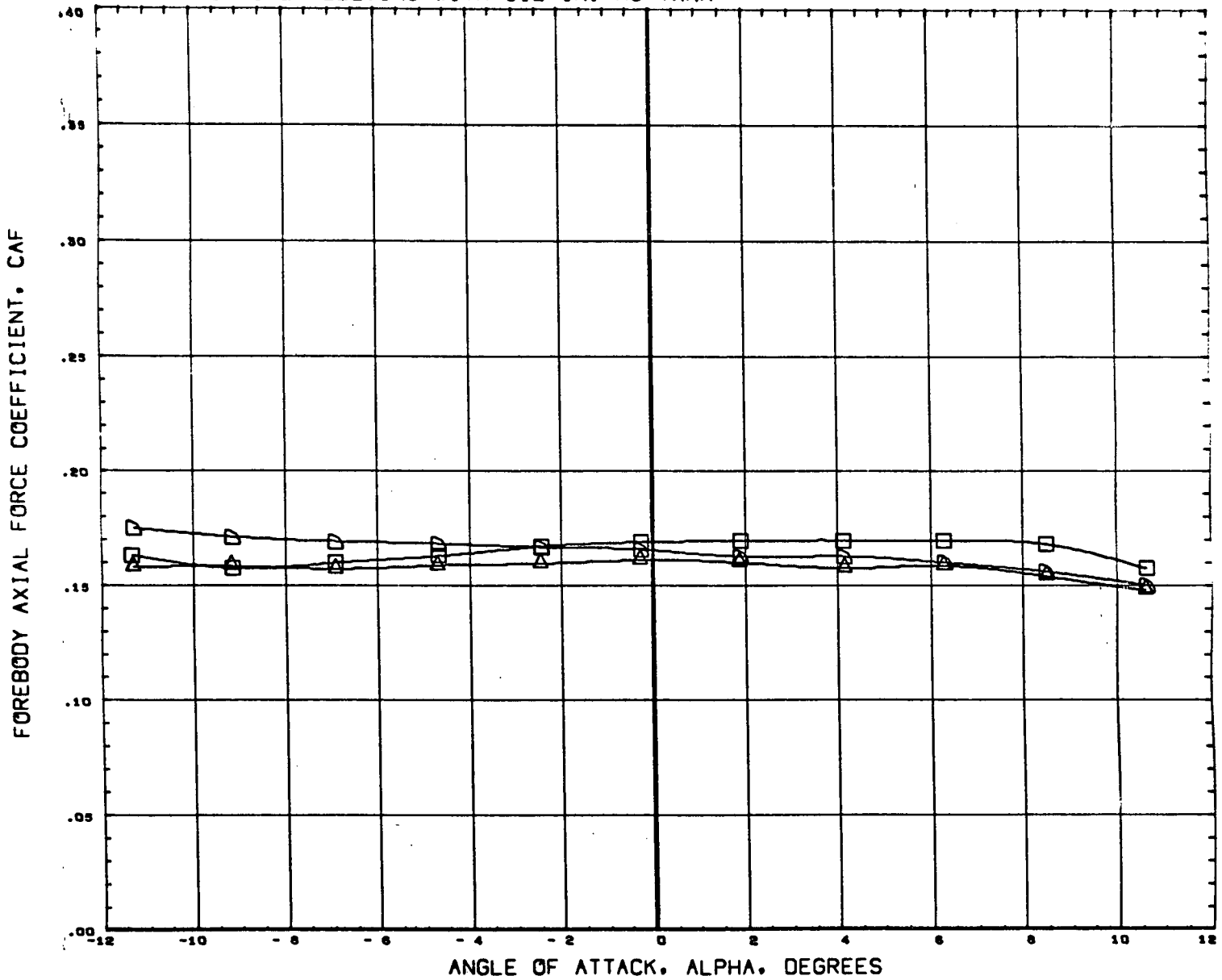
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| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK



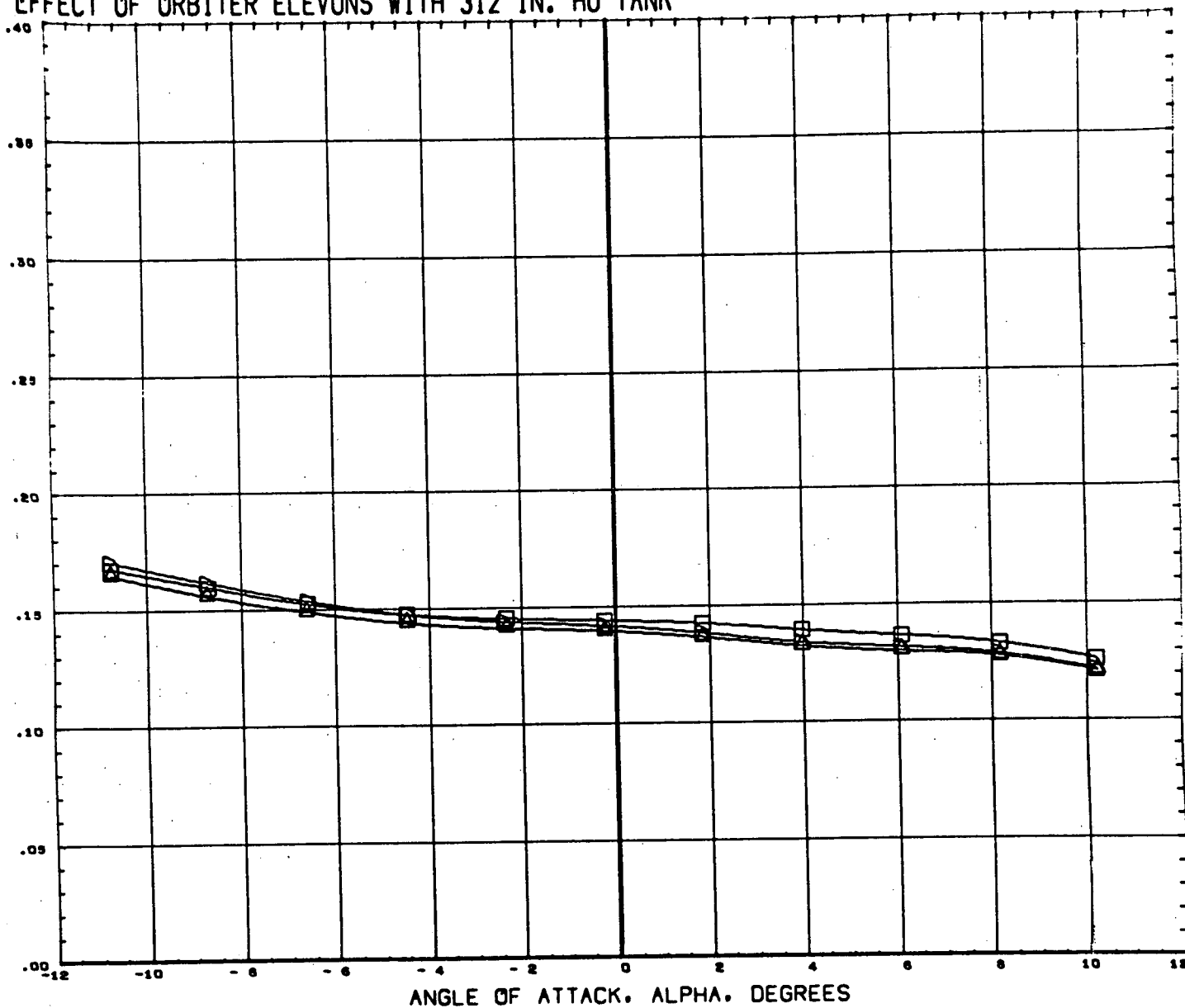
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| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.95

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

FOREBODY AXIAL FORCE COEFFICIENT, C_{AF}

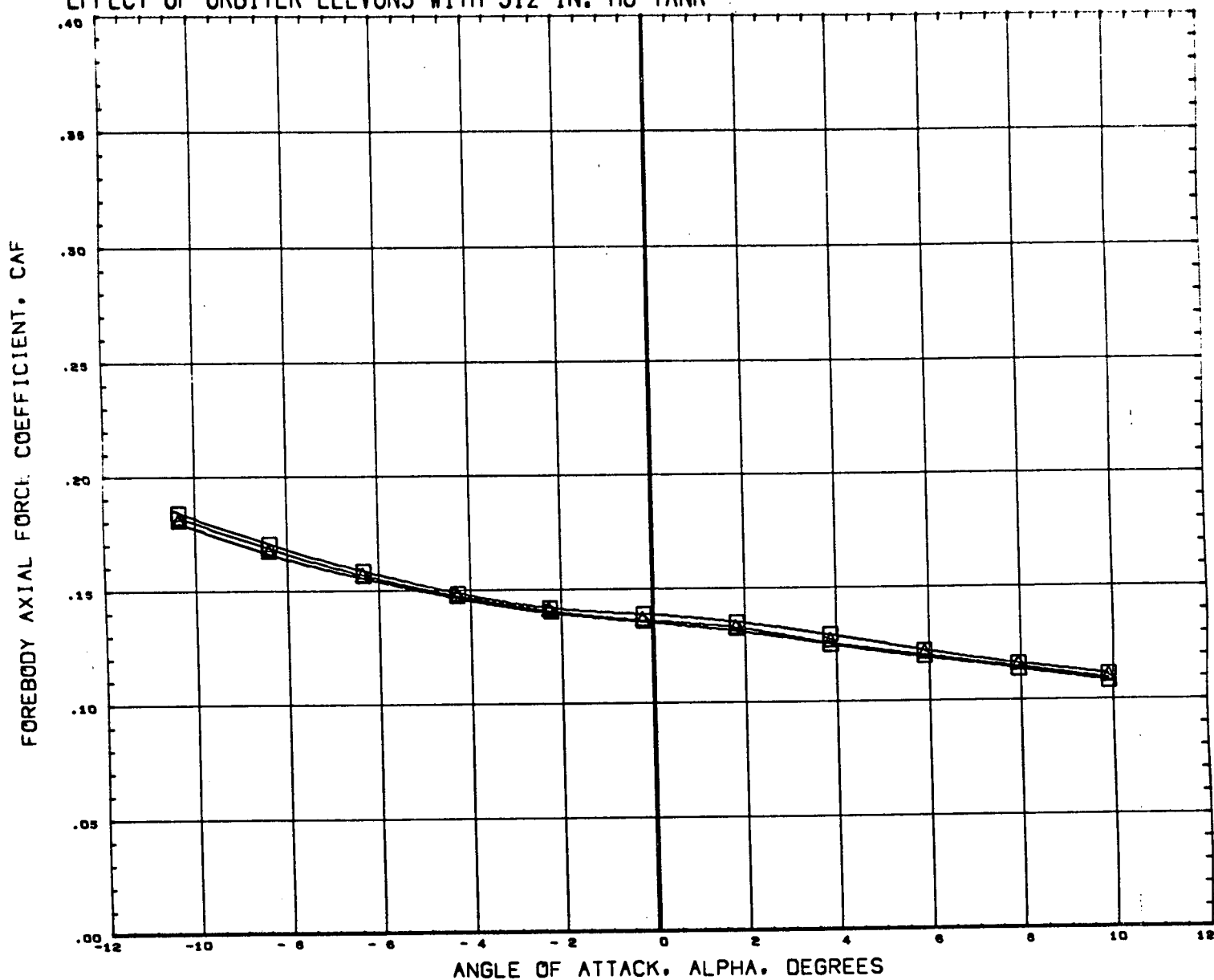


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| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



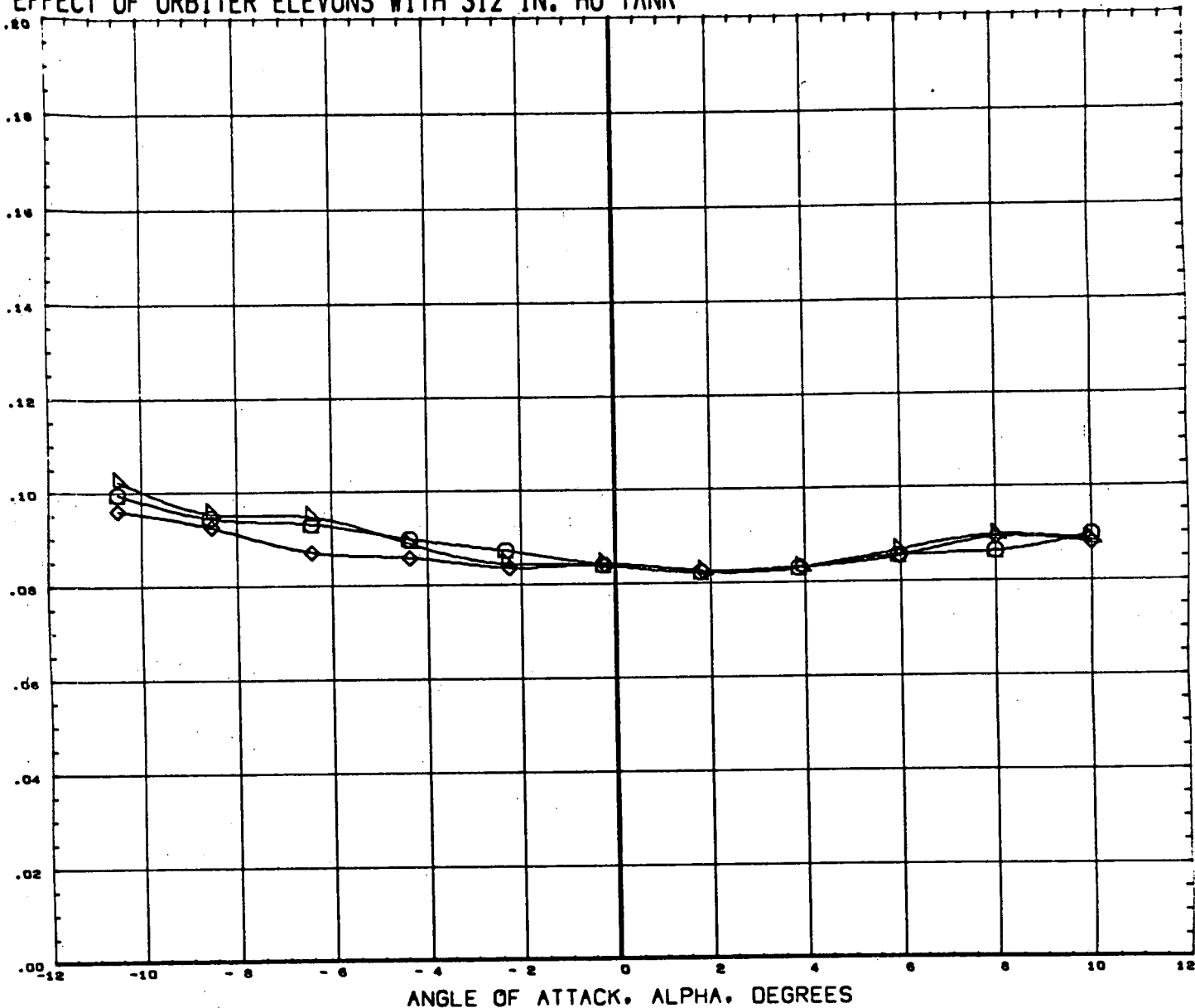
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| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

BASE AXIAL FORCE COEFFICIENT, CAB

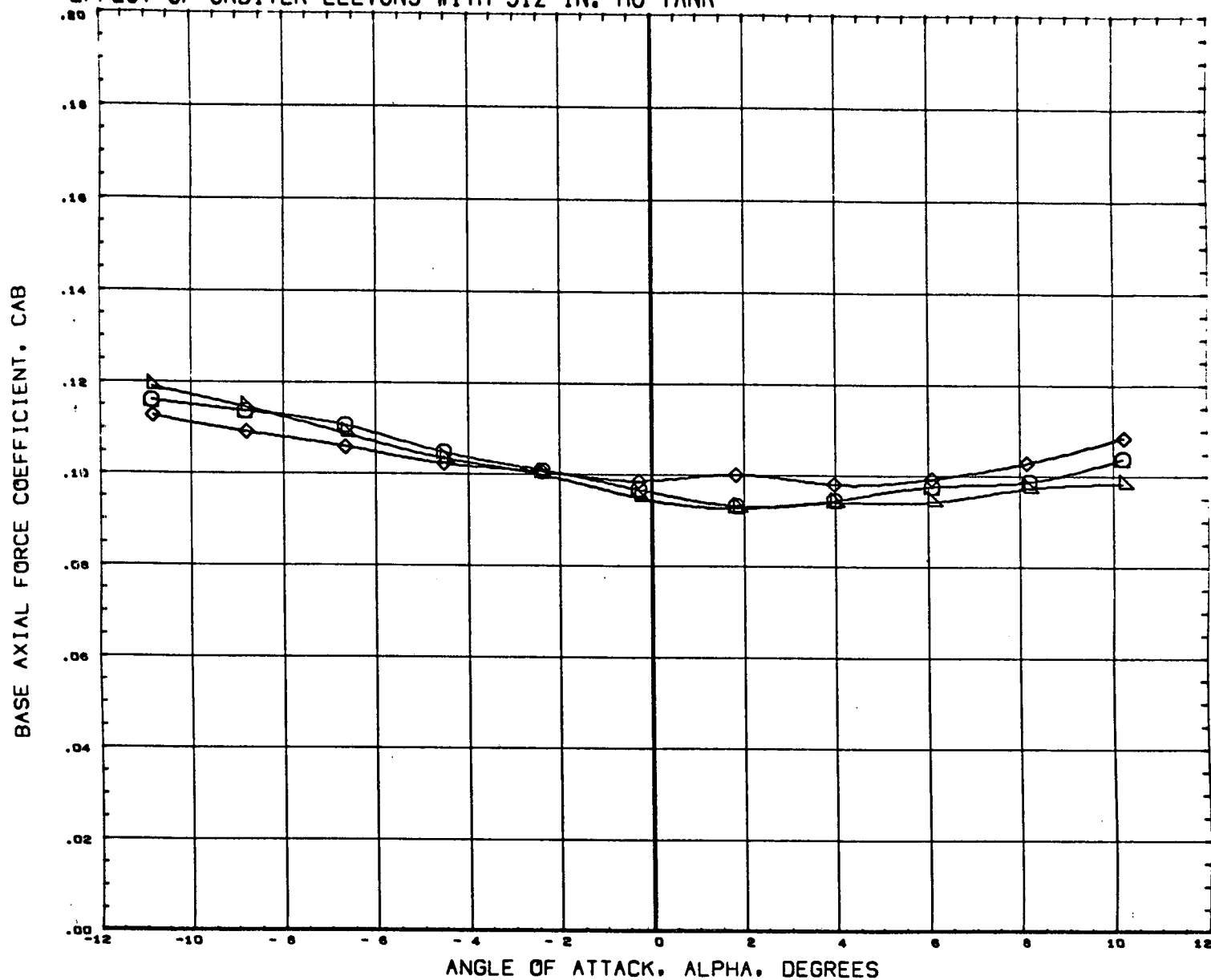


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| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.60

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



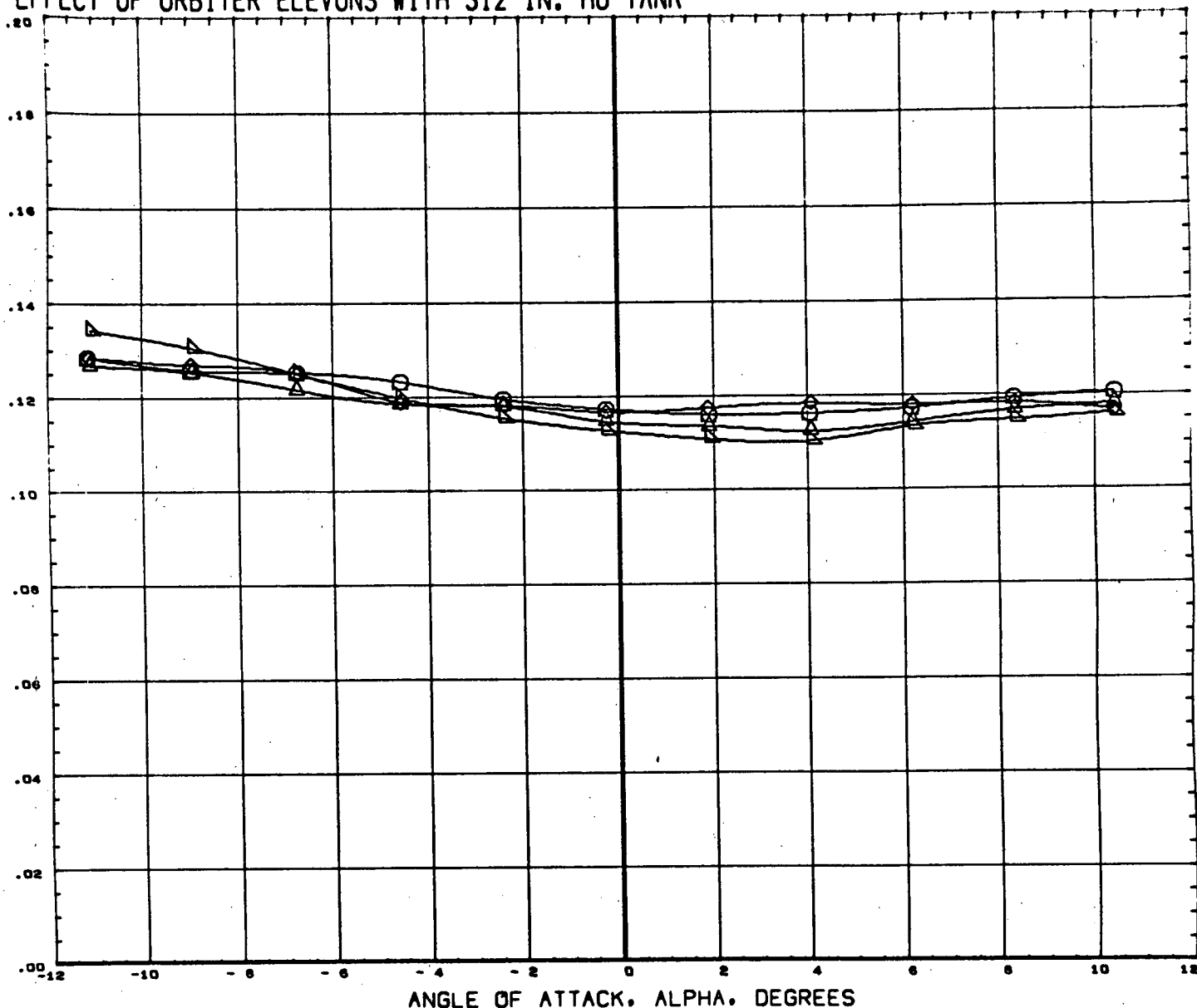
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (D71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH .90

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

BASE AXIAL FORCE COEFFICIENT, C_{AB}



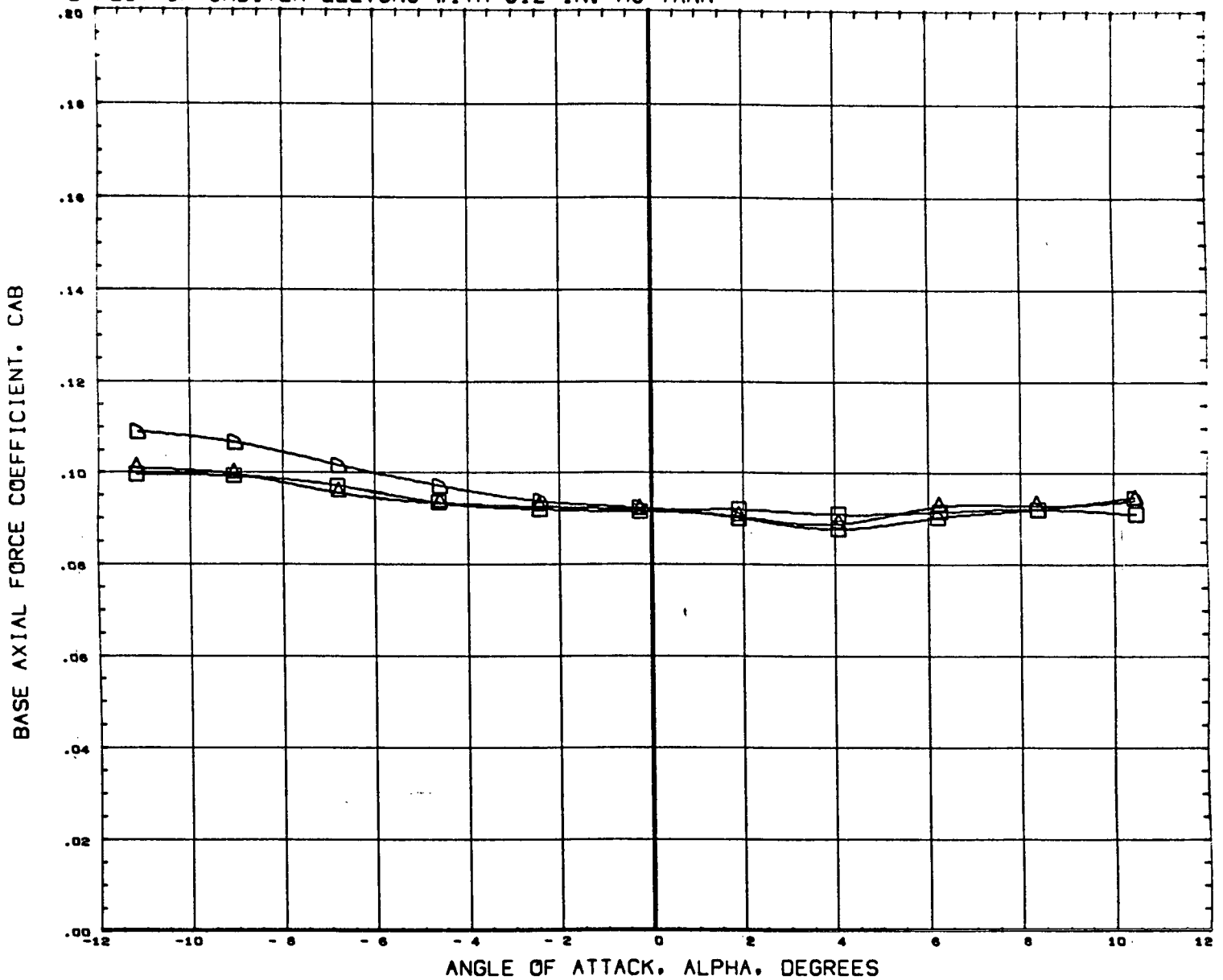
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| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | SREF | 4.4600 IN. |
| (071141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.20

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 | SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
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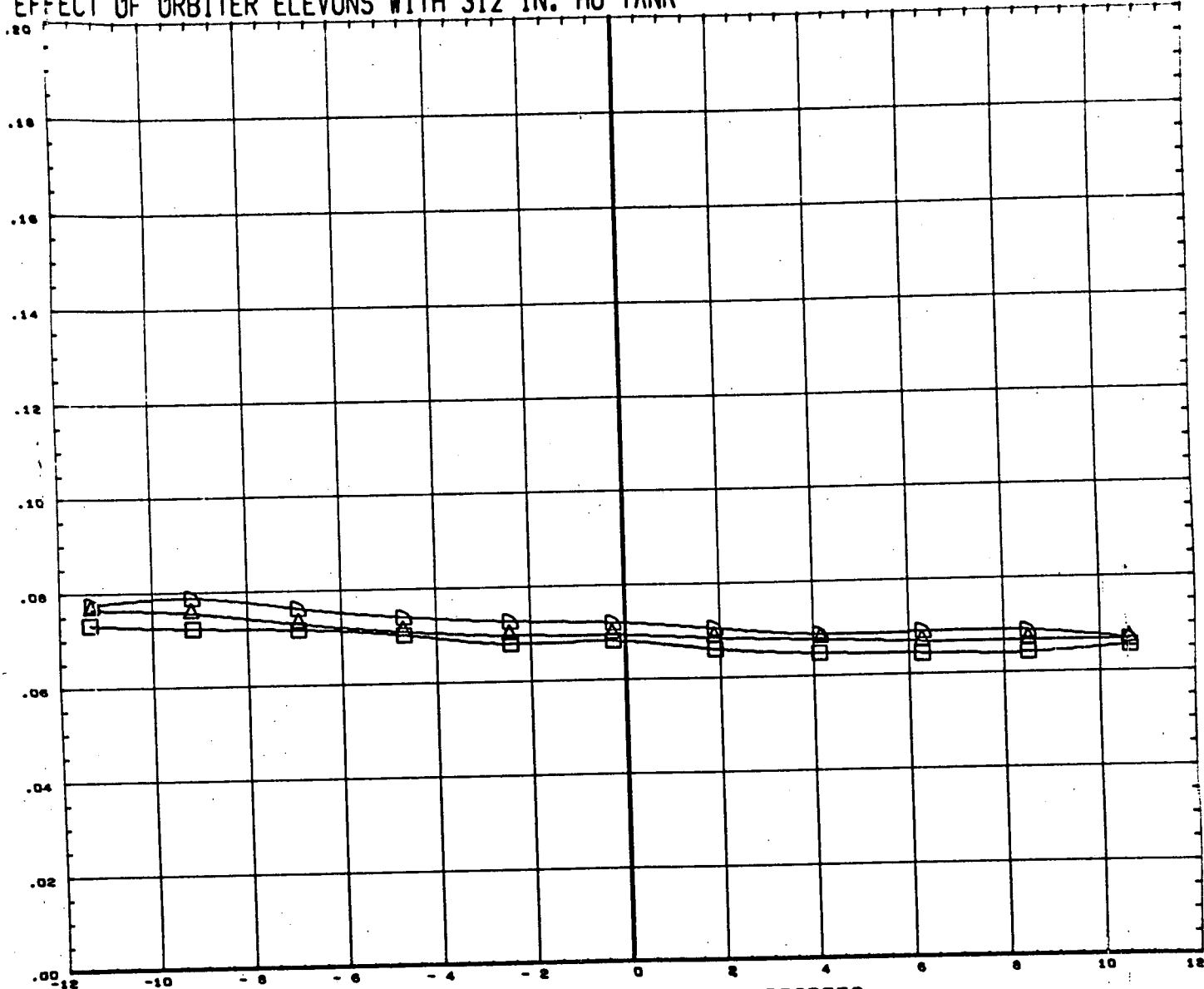
MACH

1.46

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

BASE AXIAL FORCE COEFFICIENT, C_{AB}

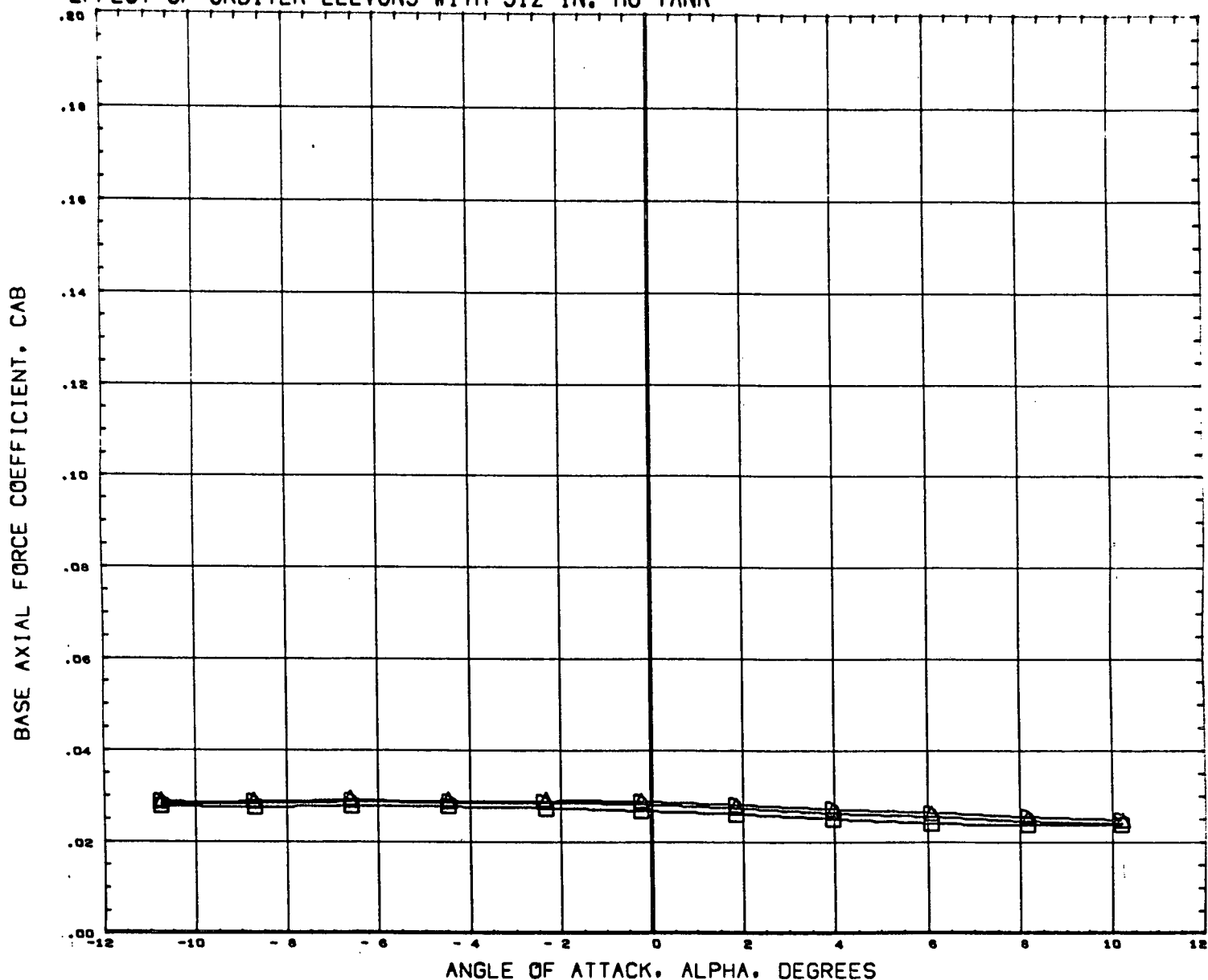


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|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRF | 3.3600 IN. |
| (071141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRF | 0.0000 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRF | 0.2460 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

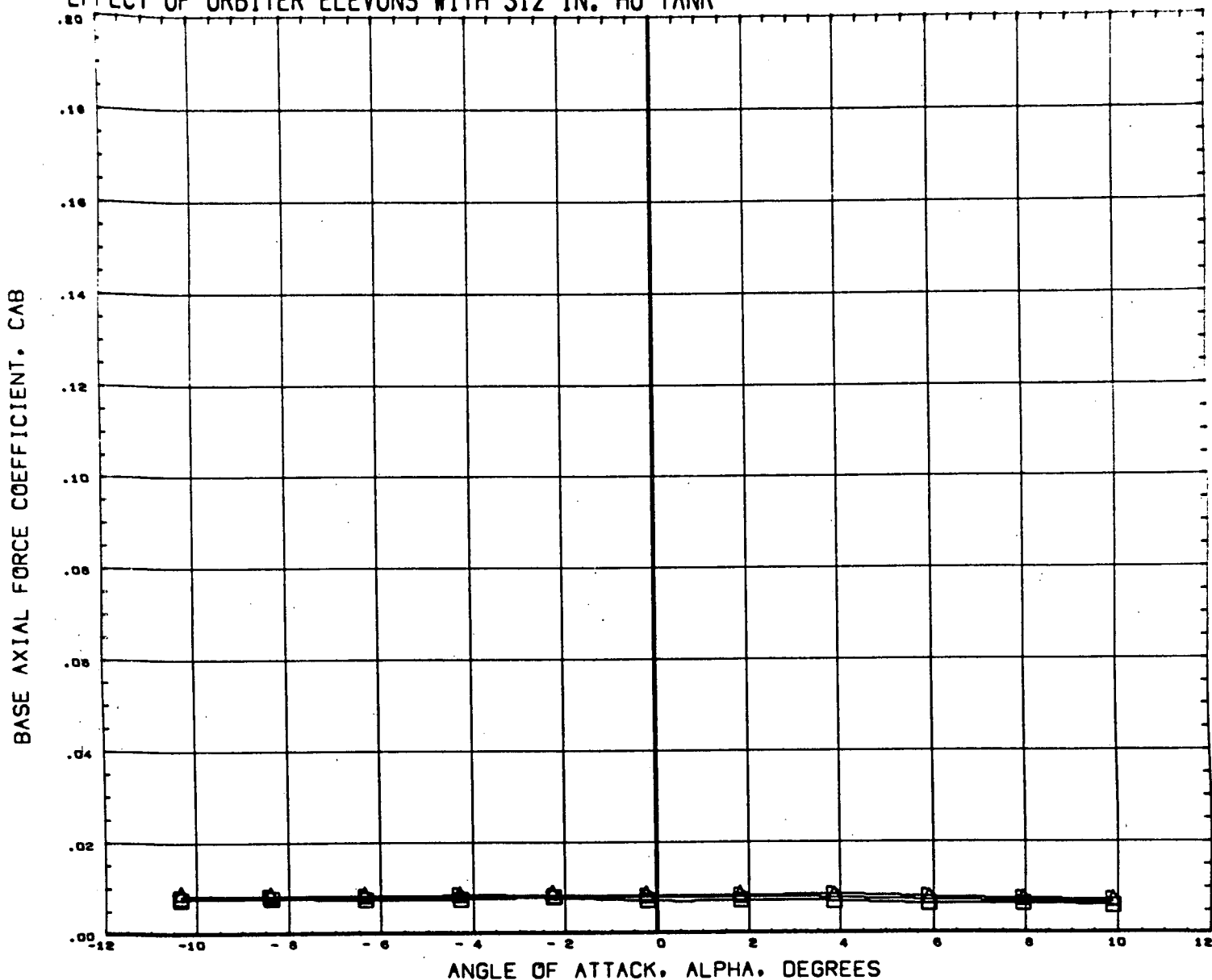


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| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (871145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (871147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
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MACH 3.48

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

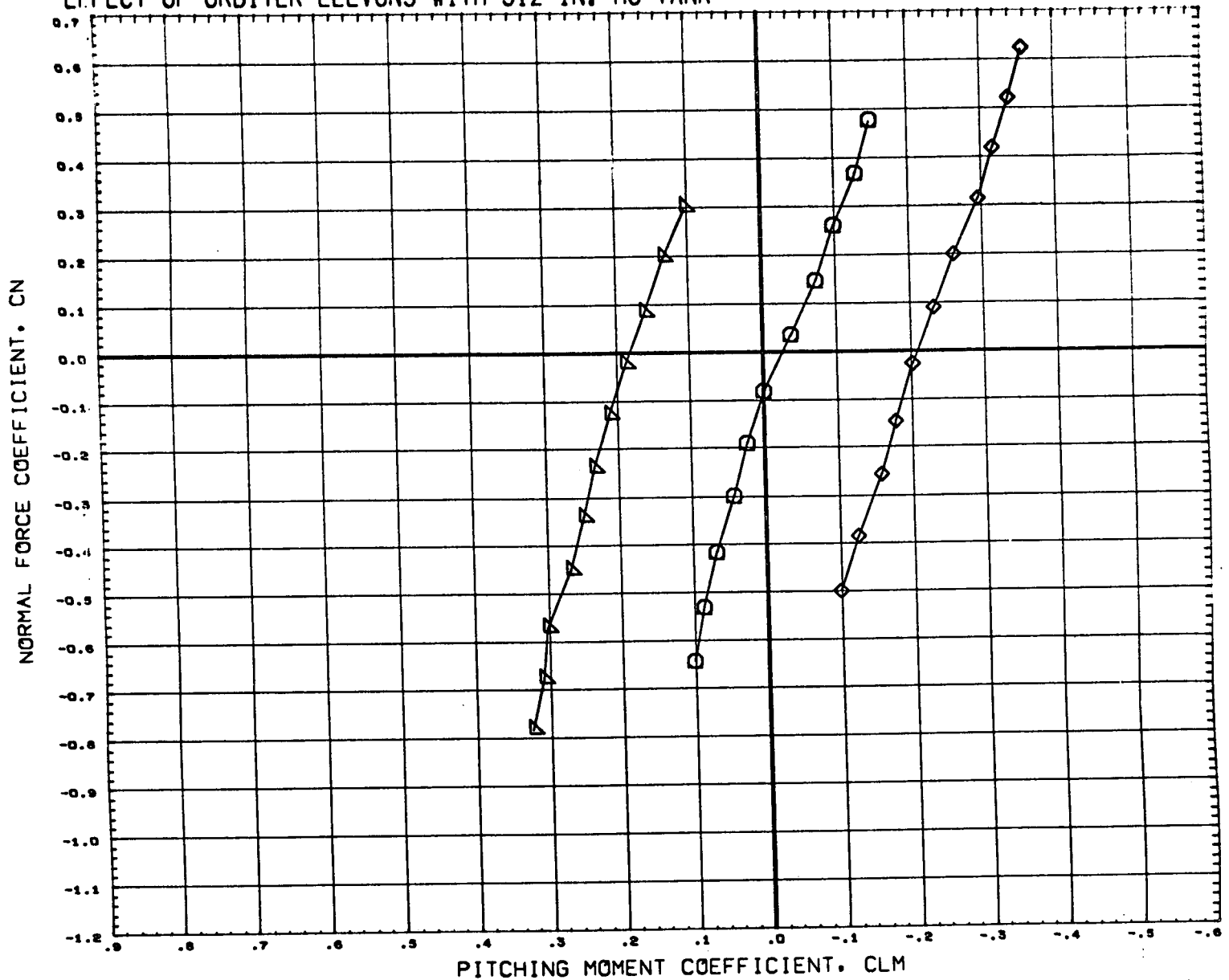


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| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 1N. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 1N. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 1N. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 1N. |
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MACH 4.96

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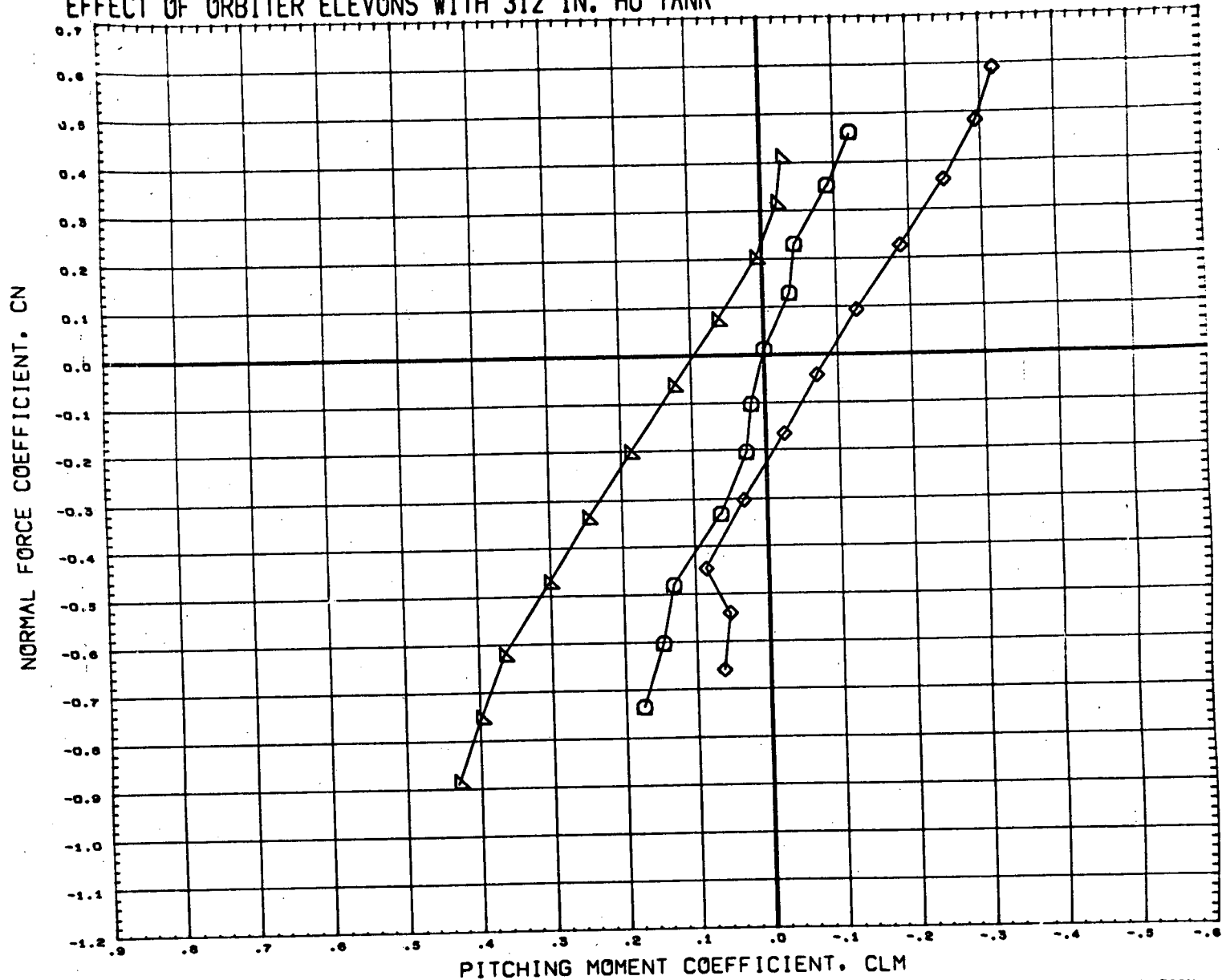
EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK



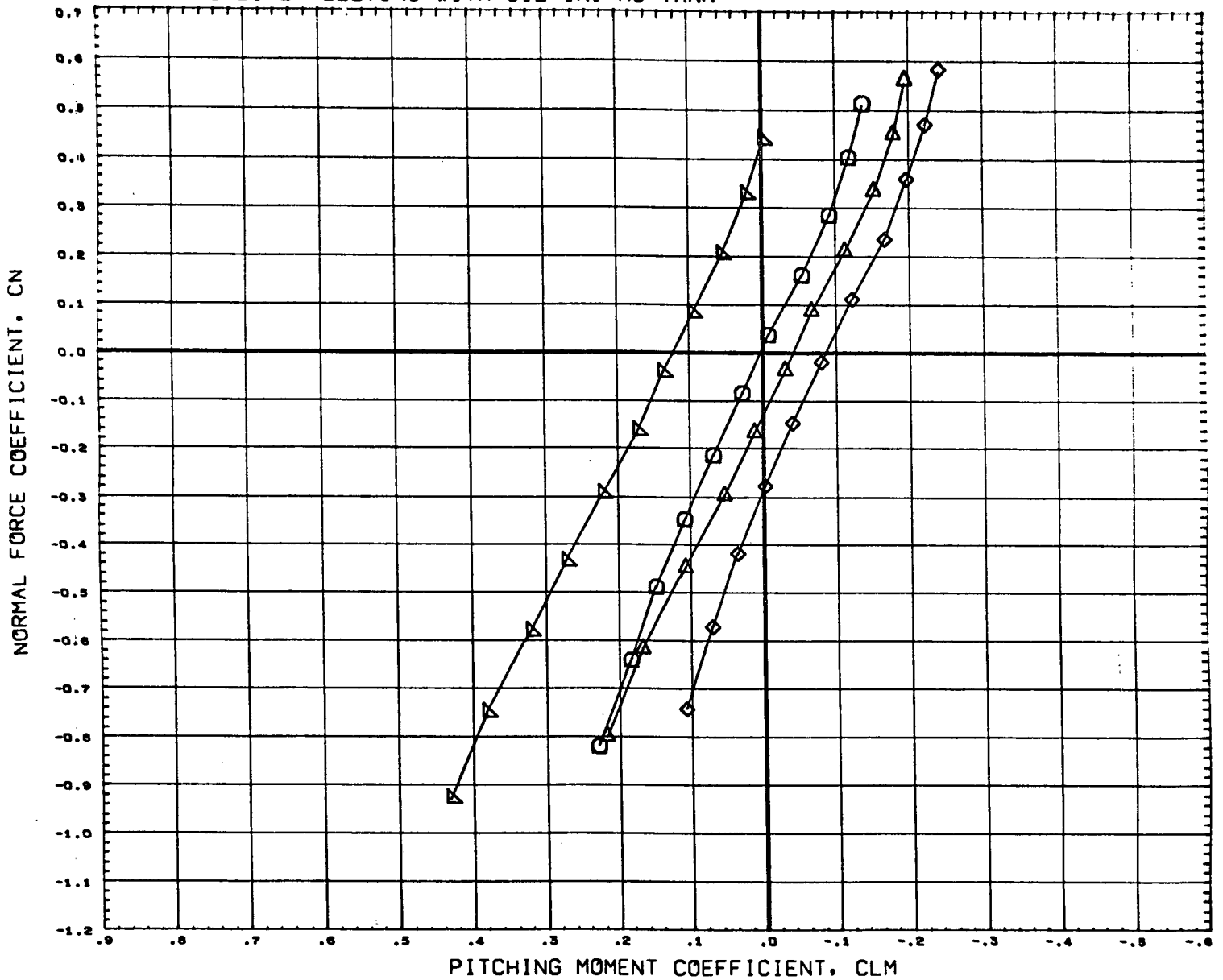
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| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (B71141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

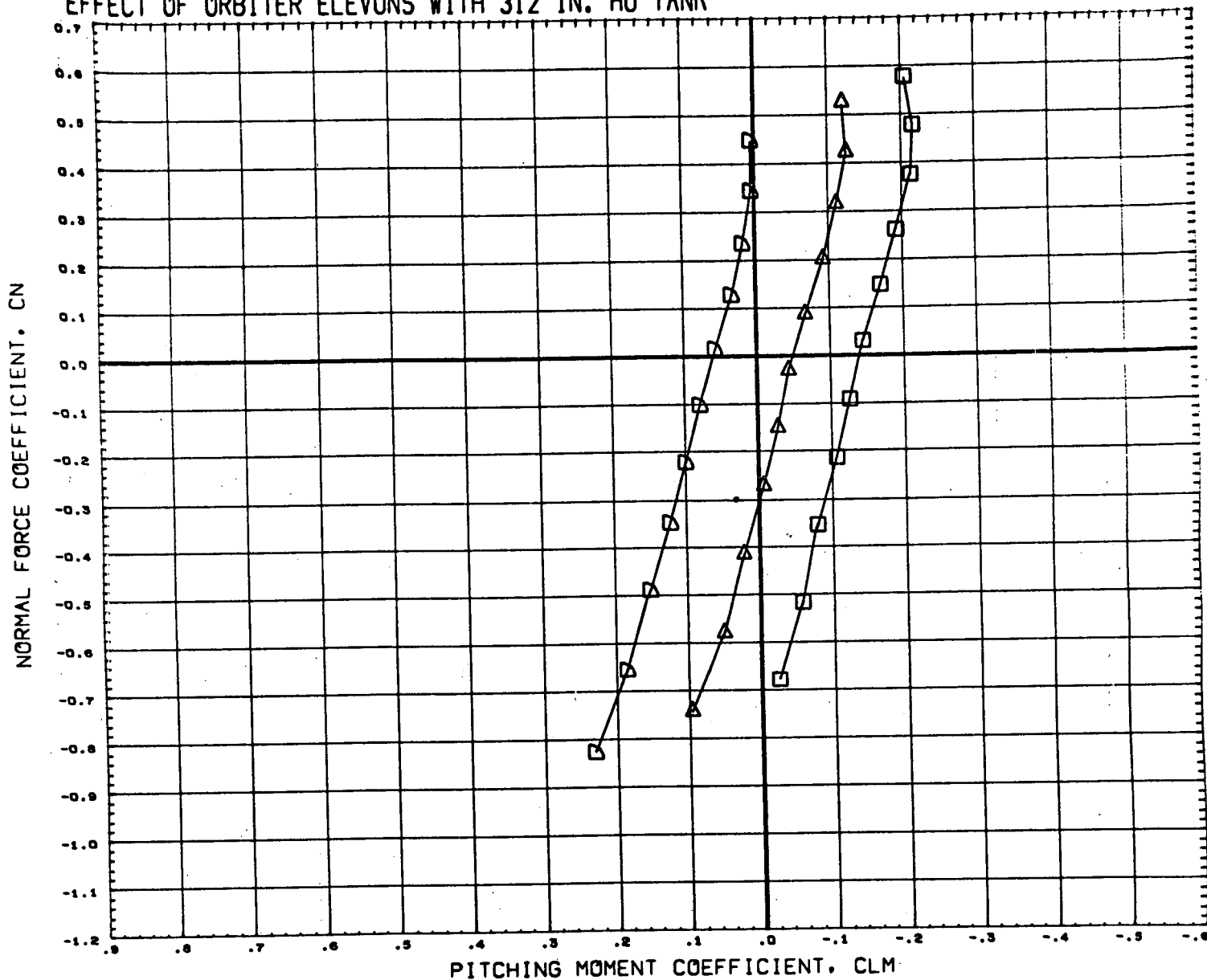


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (071145) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (071147) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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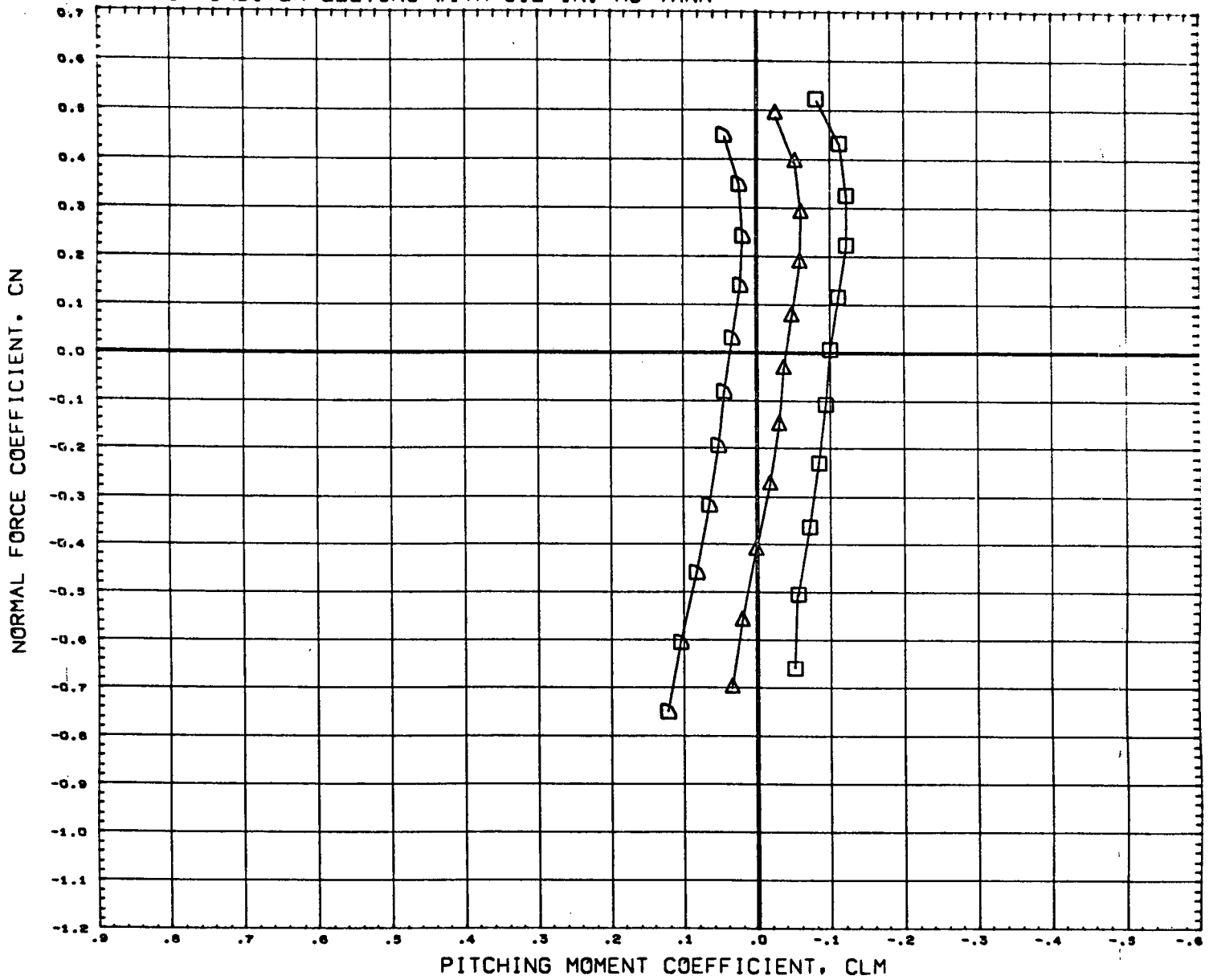
EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | SREF | 4.4600 IN. |
| (B71141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (B71147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

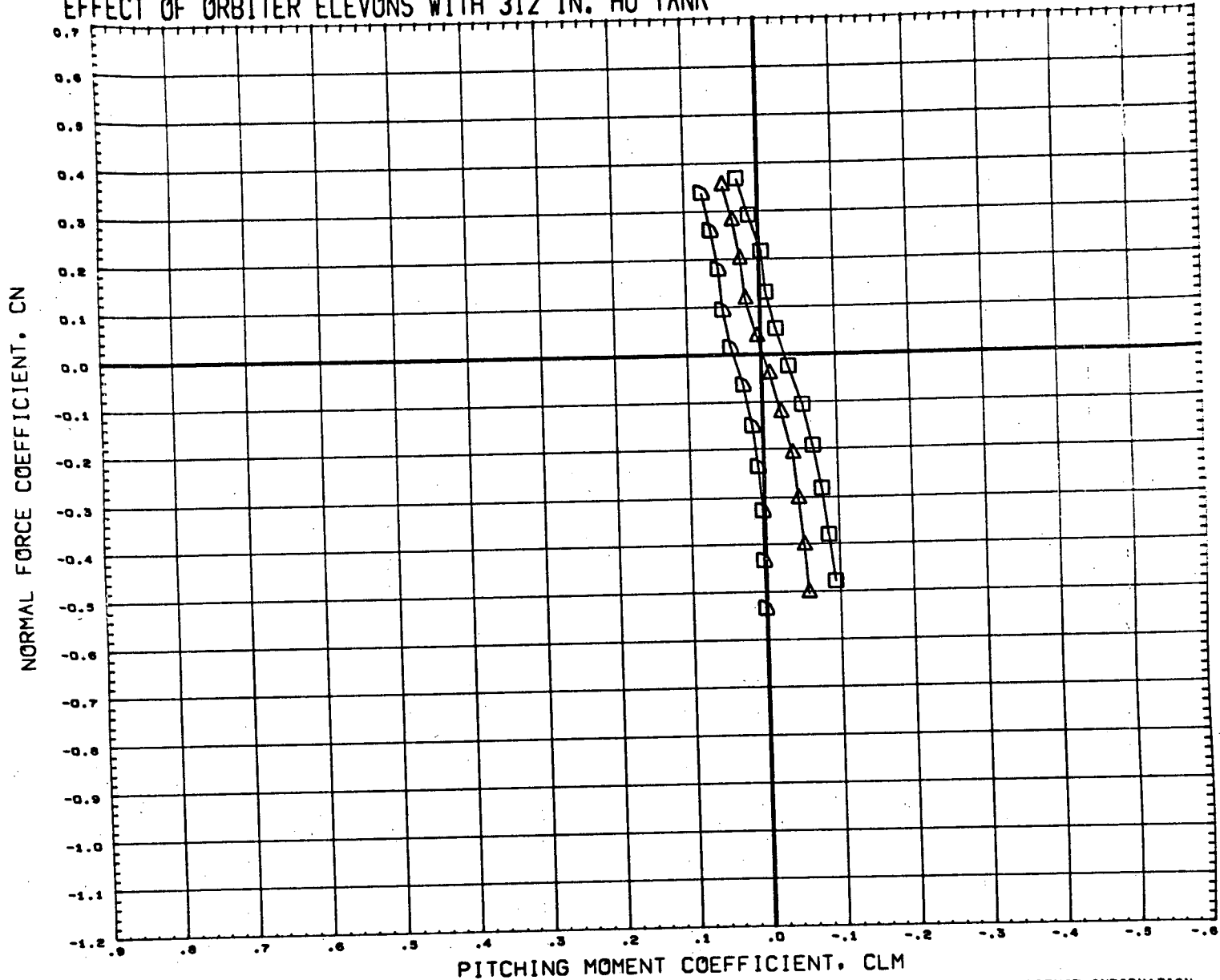


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (B71141) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (B71145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (B71147) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.95

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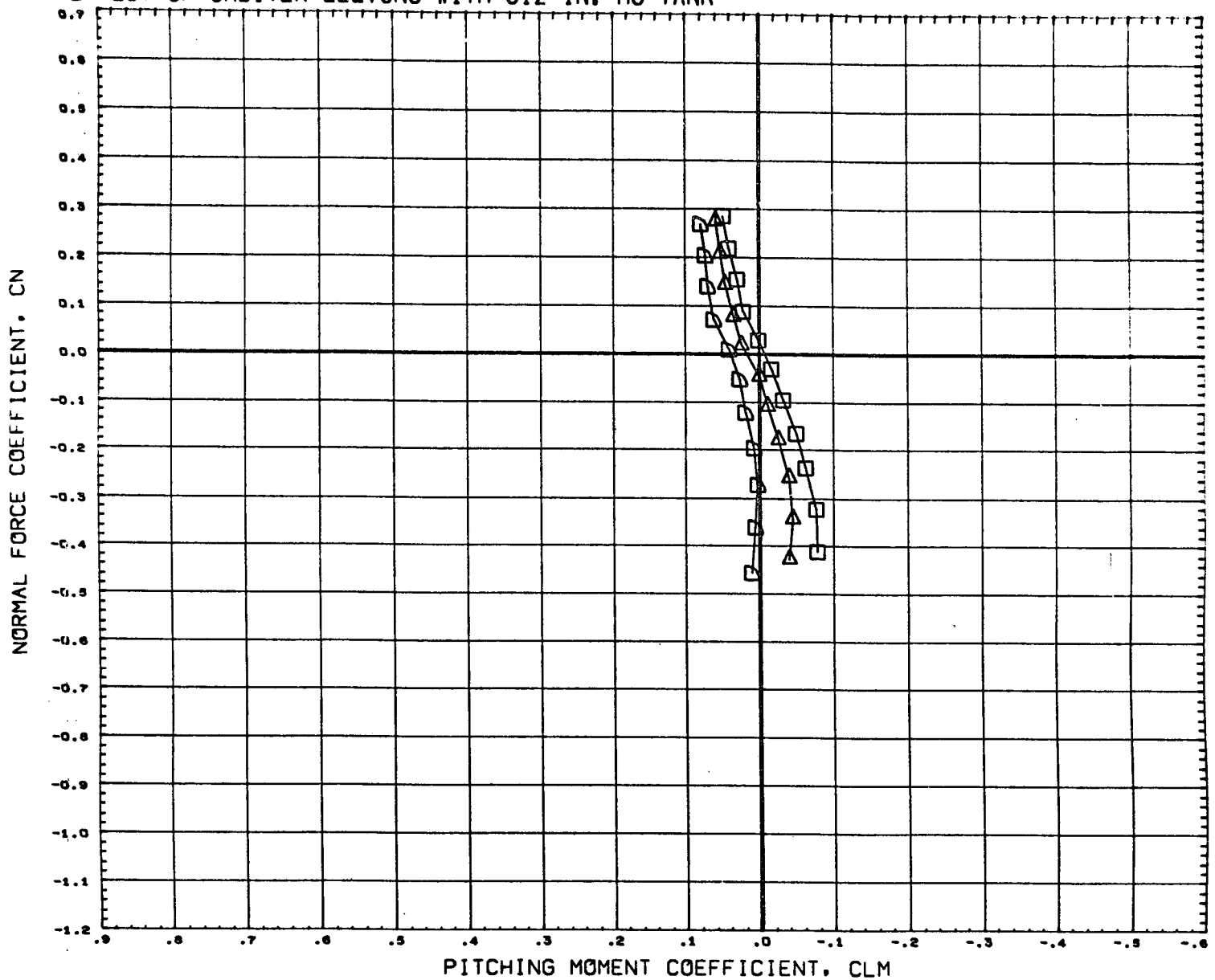
EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBN | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|---------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (071141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMHP | 3.3600 IN. |
| (071145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMHP | 0.0000 IN. |
| (071147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMHP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK

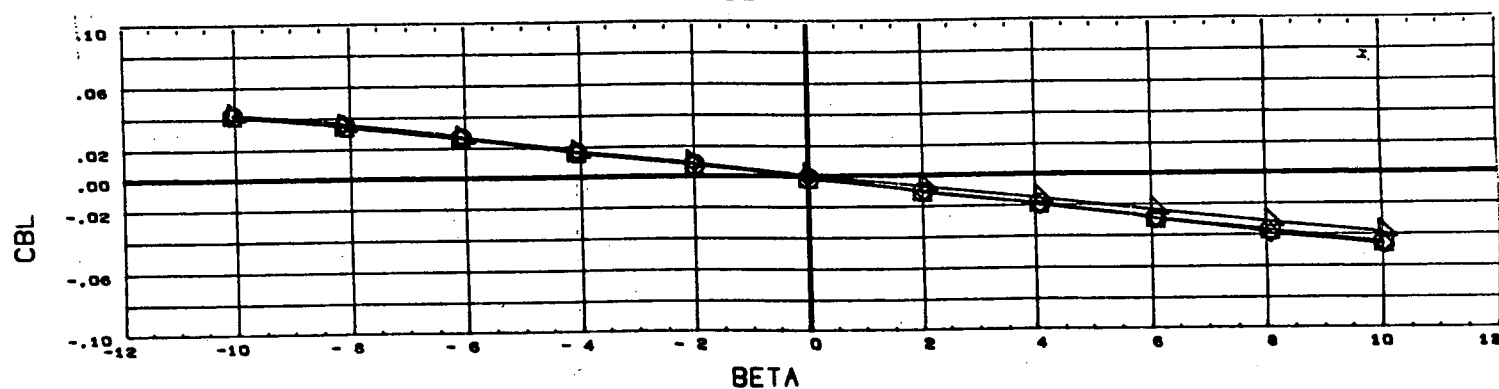
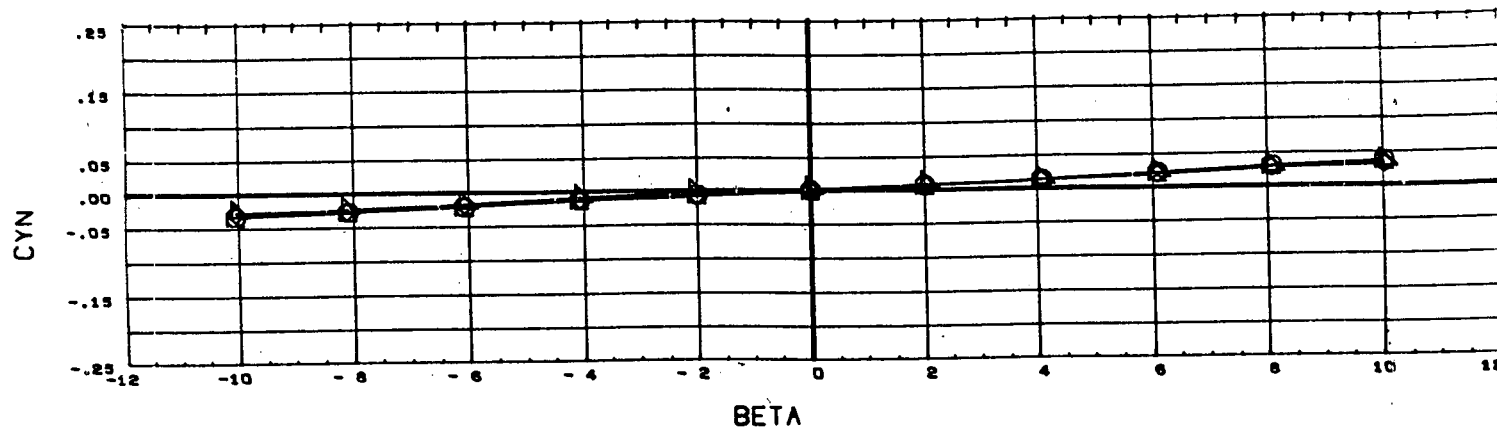
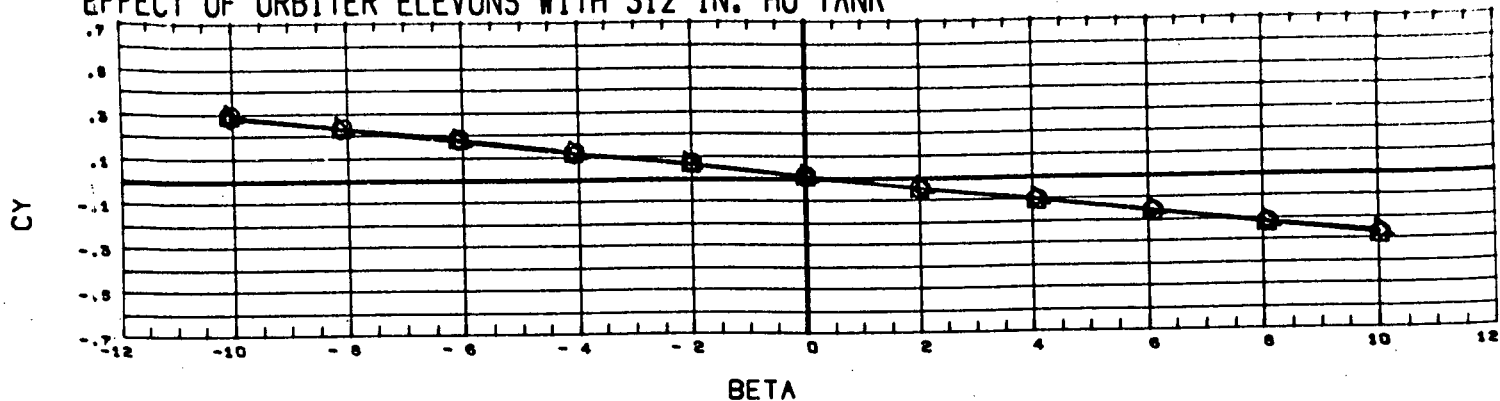


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871143) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (871141) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XHRP | 3.3600 IN. |
| (871145) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YHRP | 0.0000 IN. |
| (871147) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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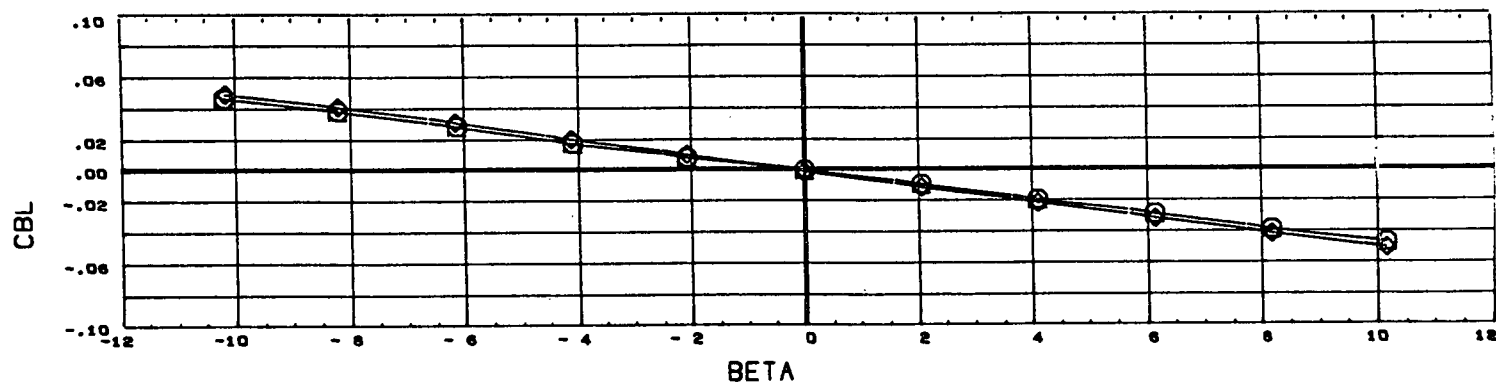
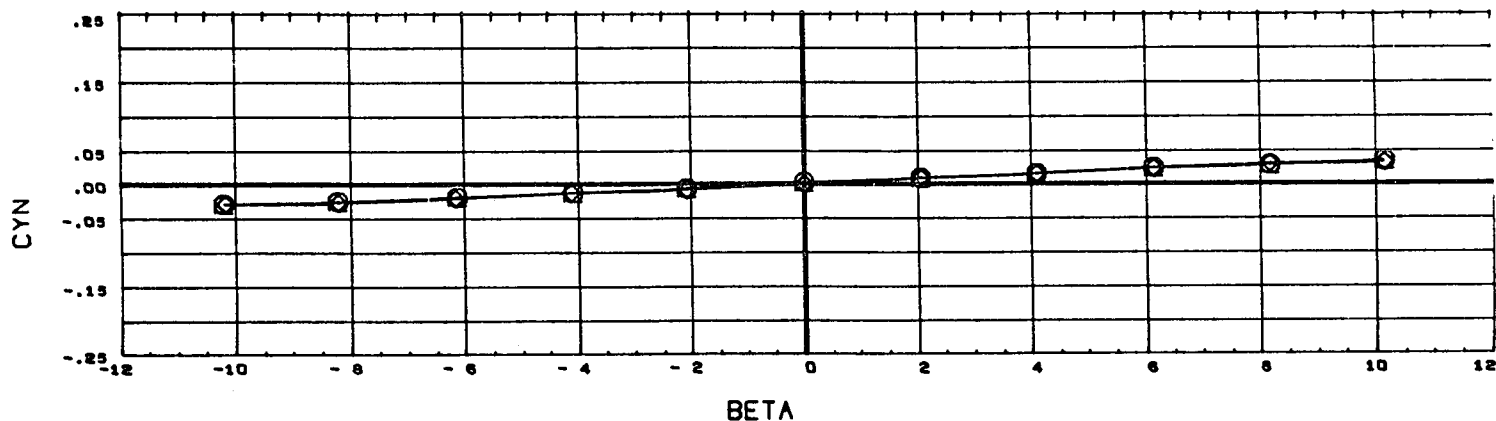
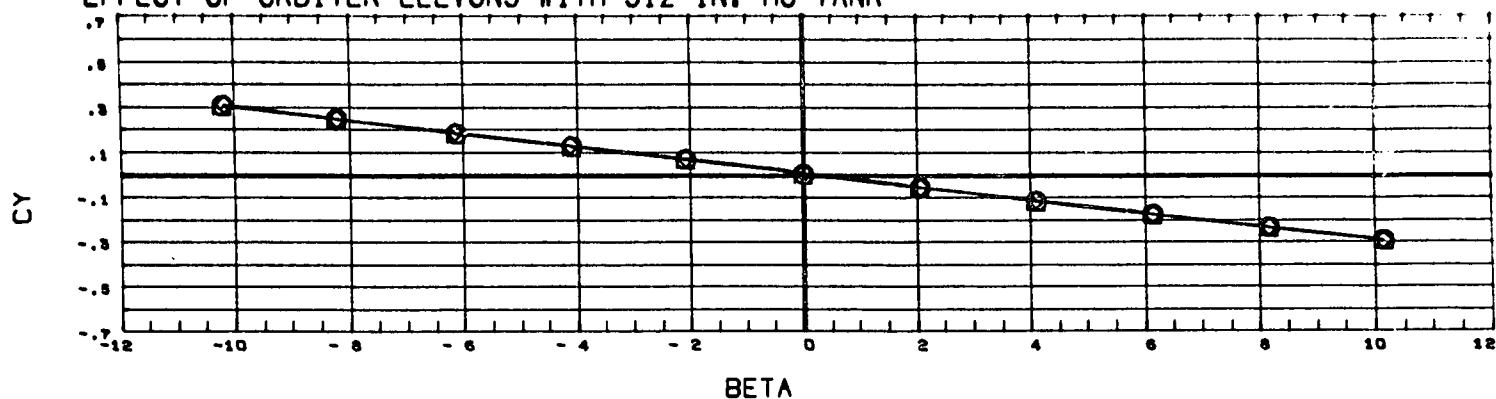
EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71144) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XHRP | 3.3800 IN. |
| (A71146) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YHRP | 0.0000 IN. |
| (A71148) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

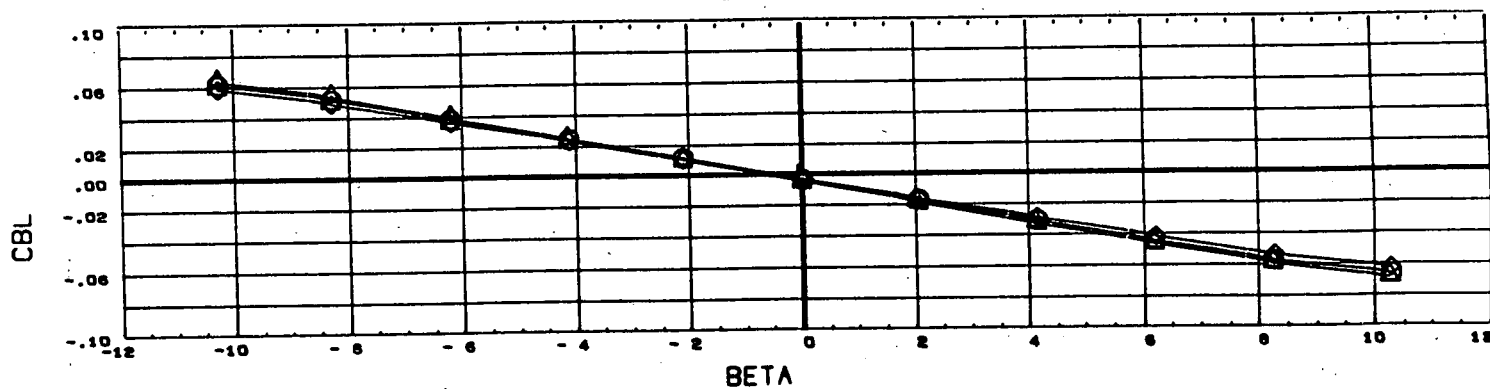
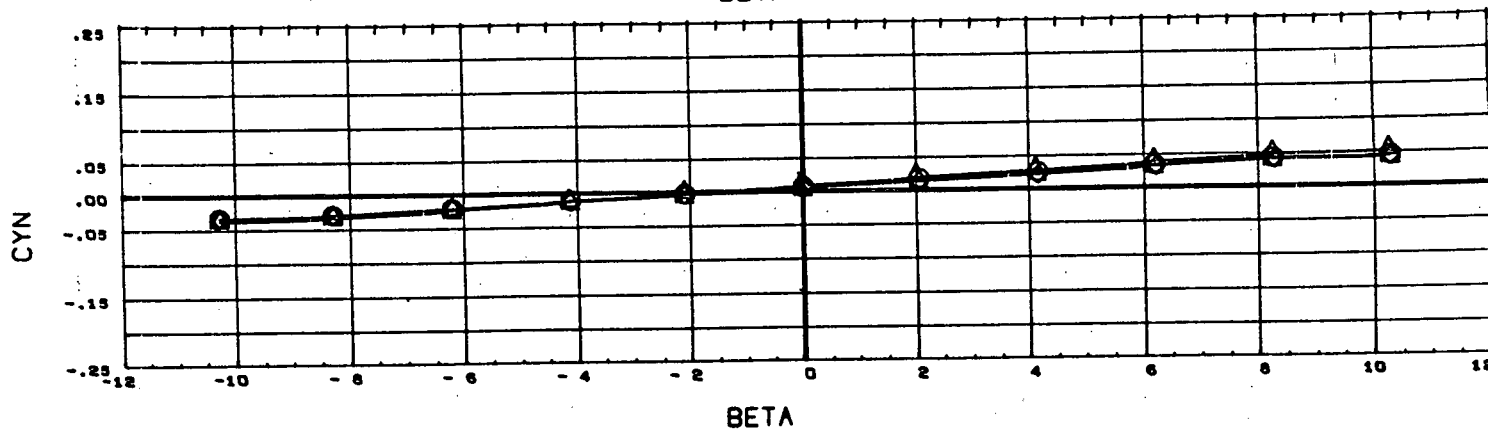
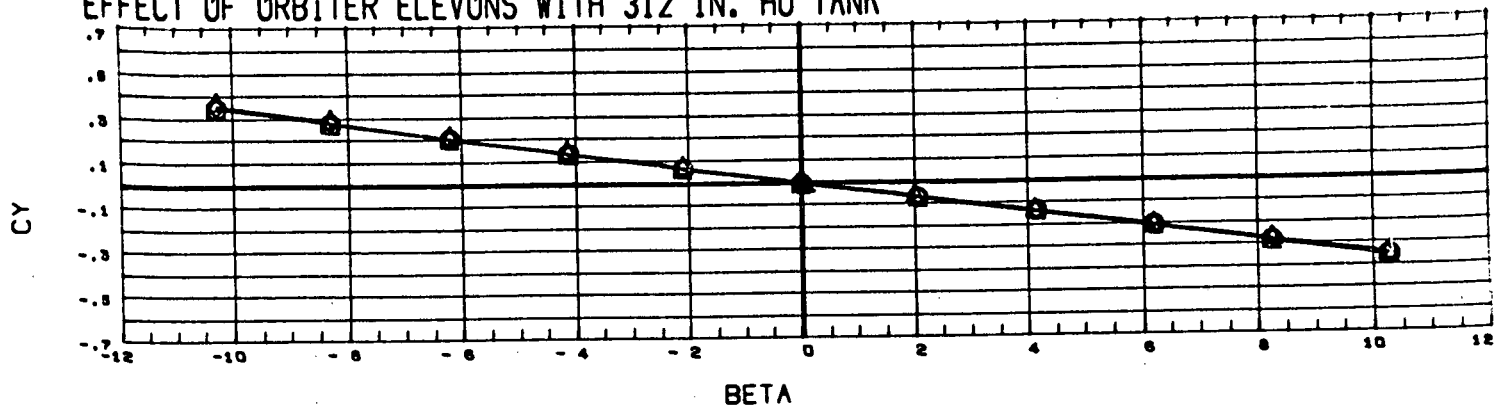
EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71144) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .91

EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

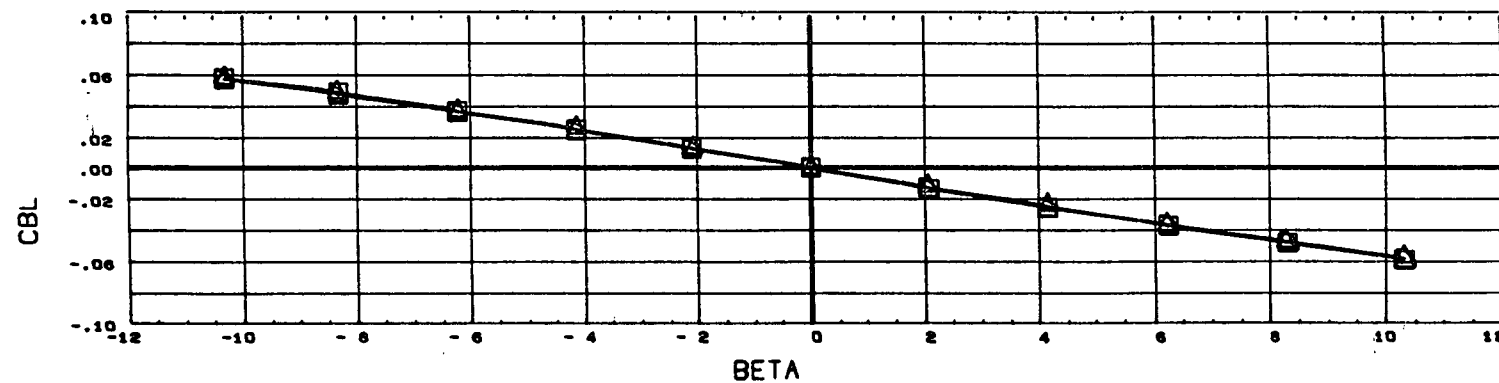
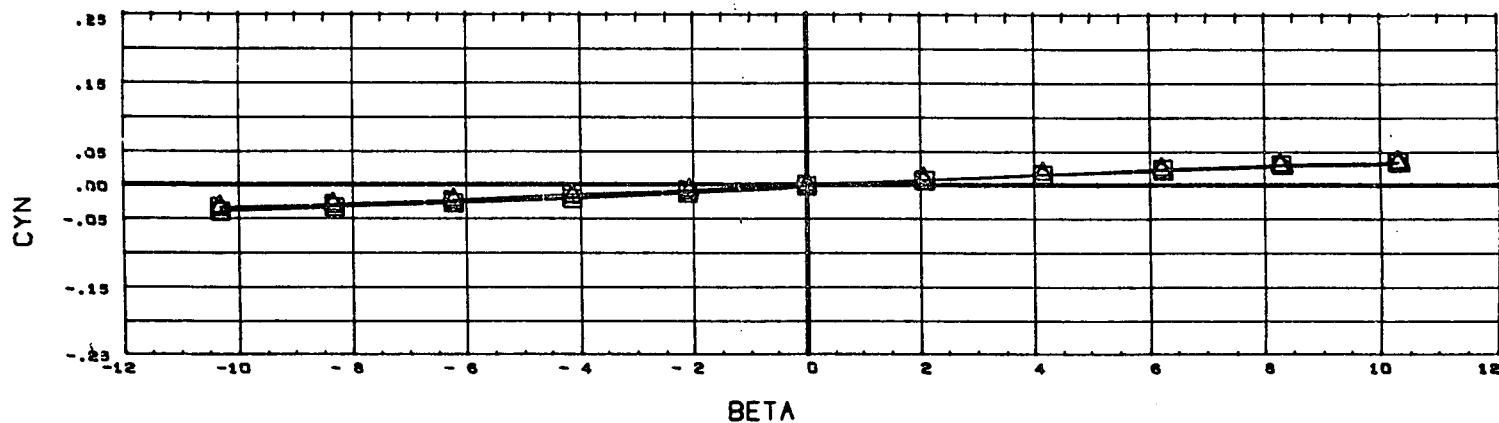
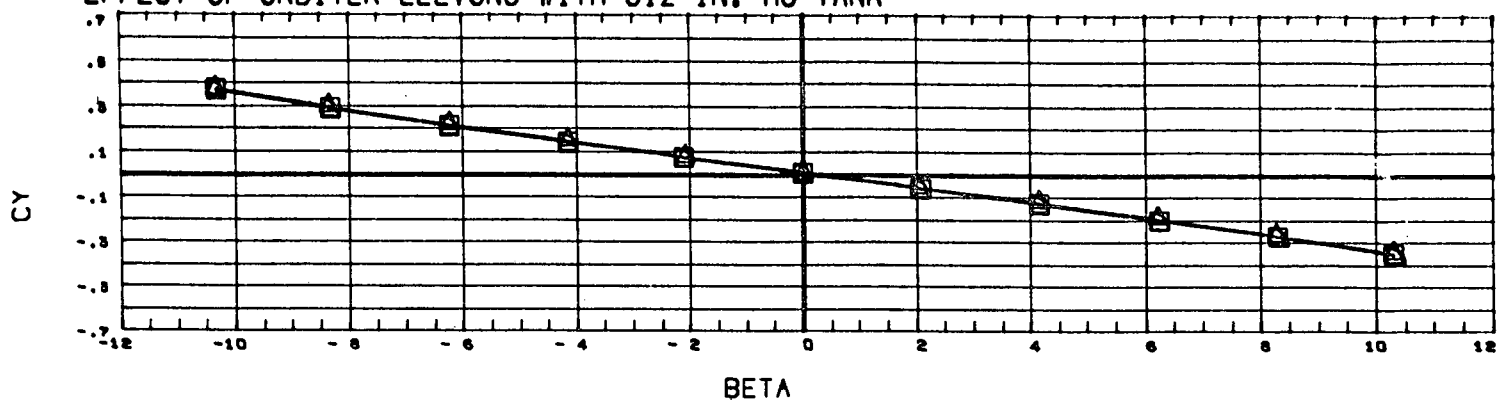


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71144) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XHRP | 3.3600 IN. |
| (A71146) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YHRP | 0.0000 IN. |
| (A71148) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.19

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

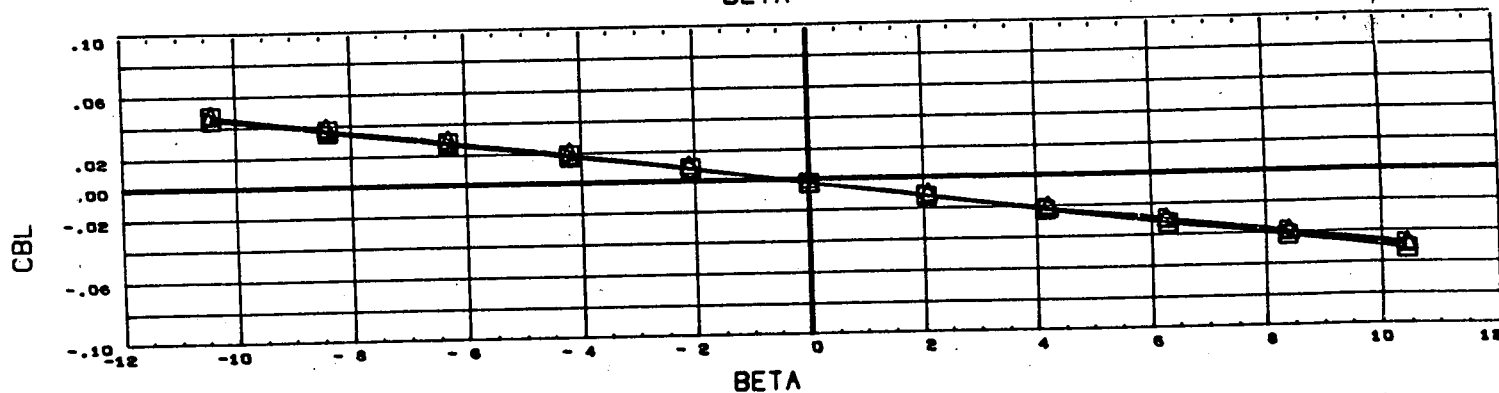
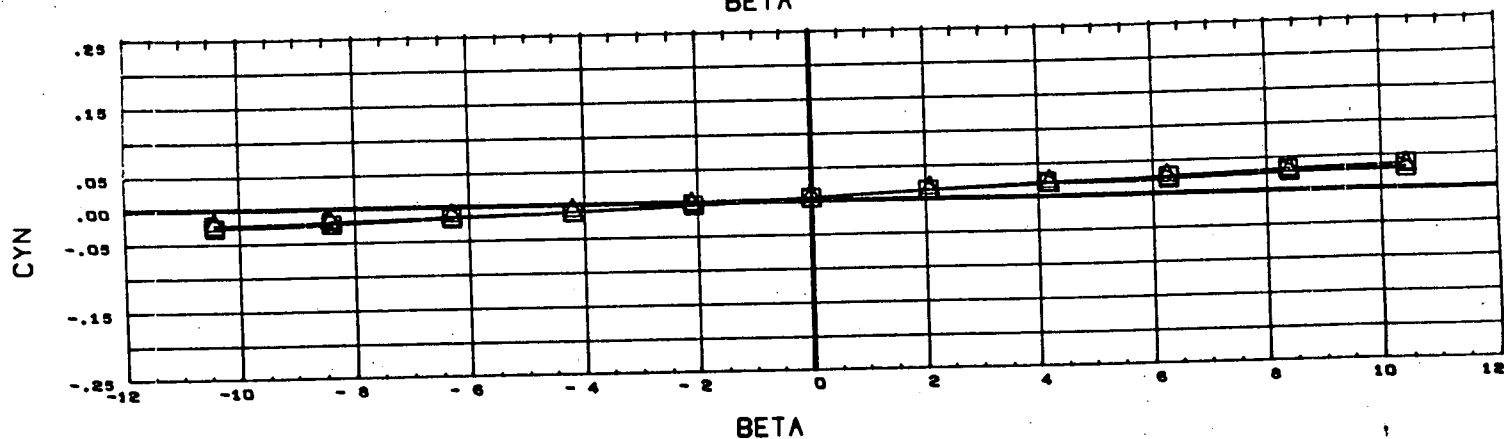
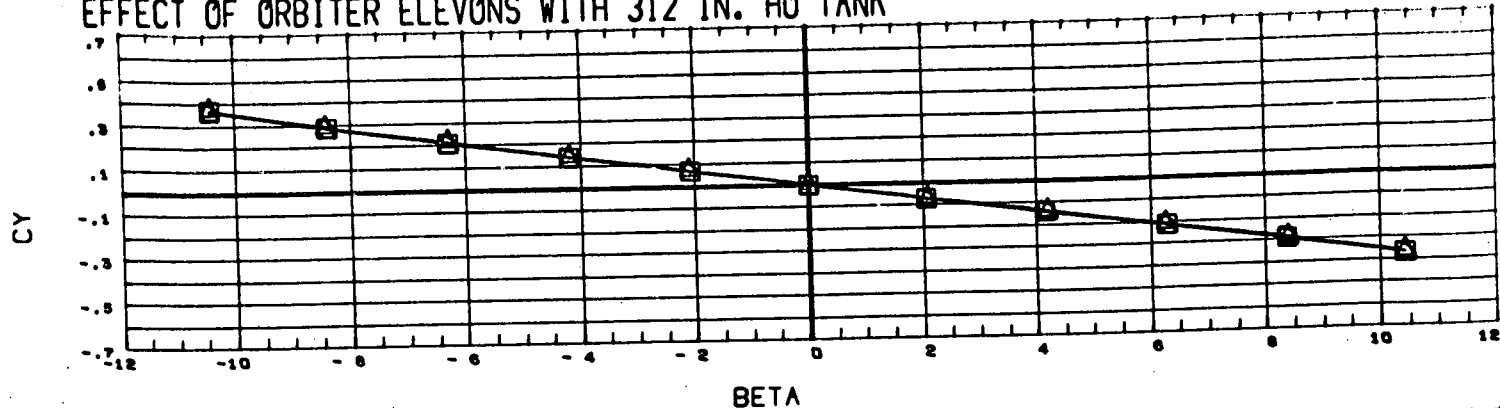


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

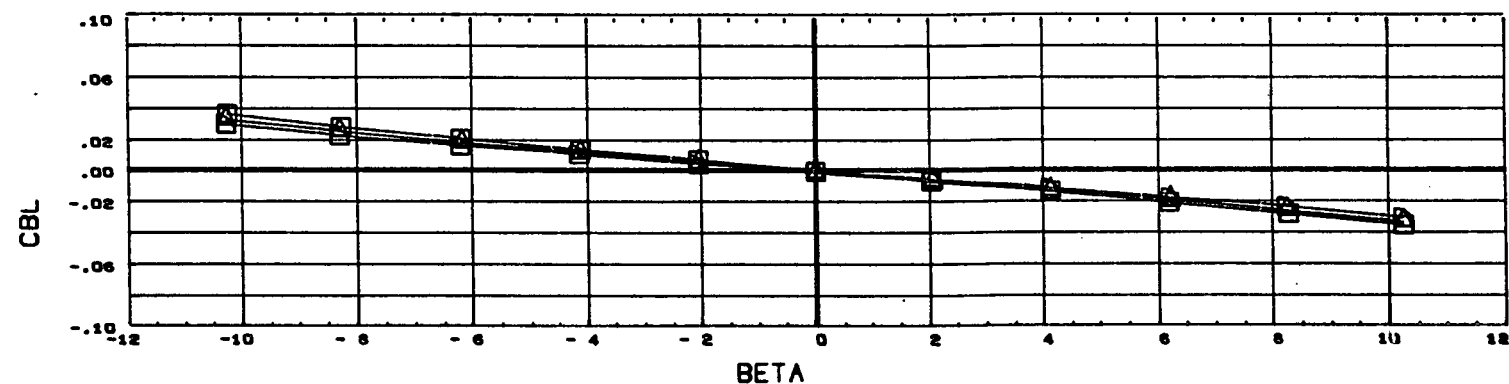
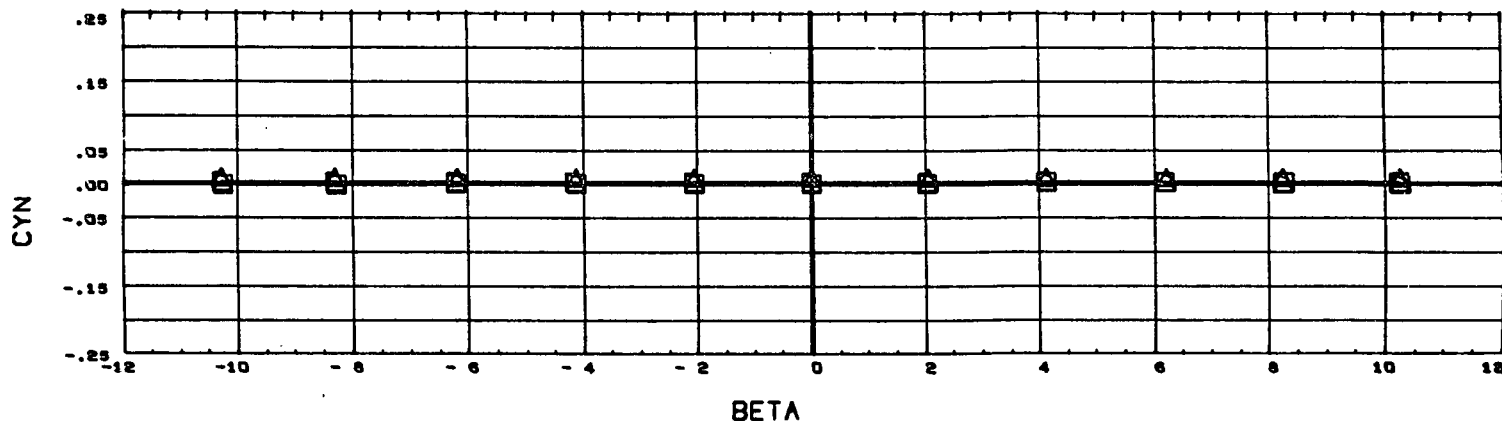
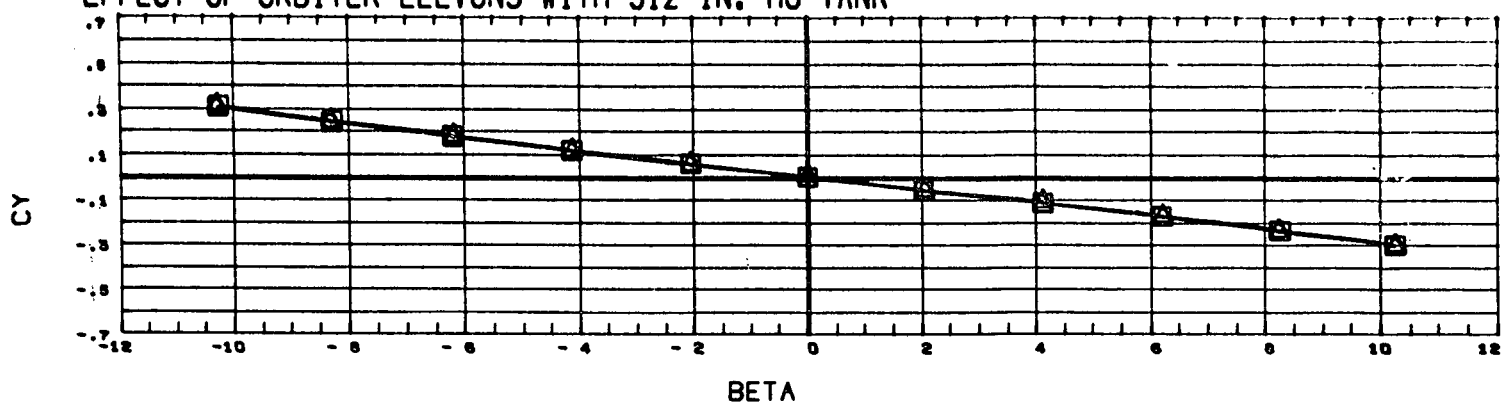


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|---------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 | IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (A71142) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 10.000 | 0.000 | XHRP | 3.3600 | IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YHRP | 0.0000 | IN. |
| (A71148) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | -10.000 | 0.000 | ZHRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH

1.95

EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

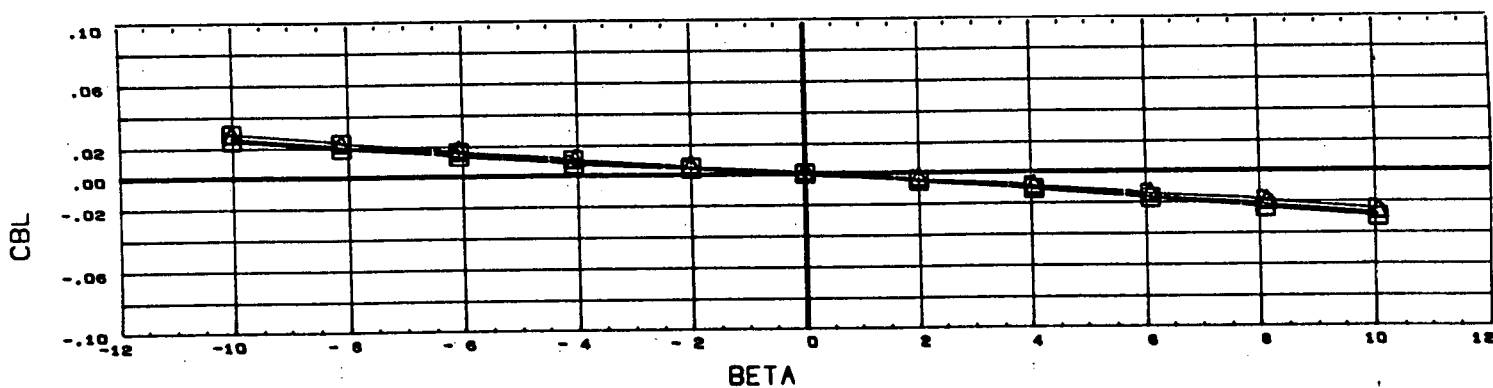
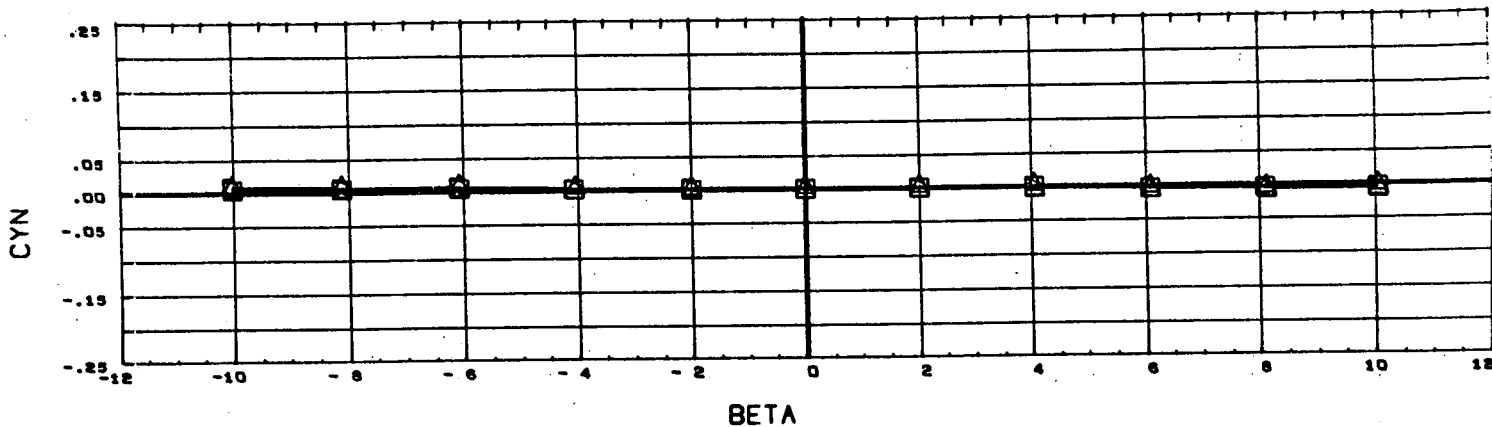
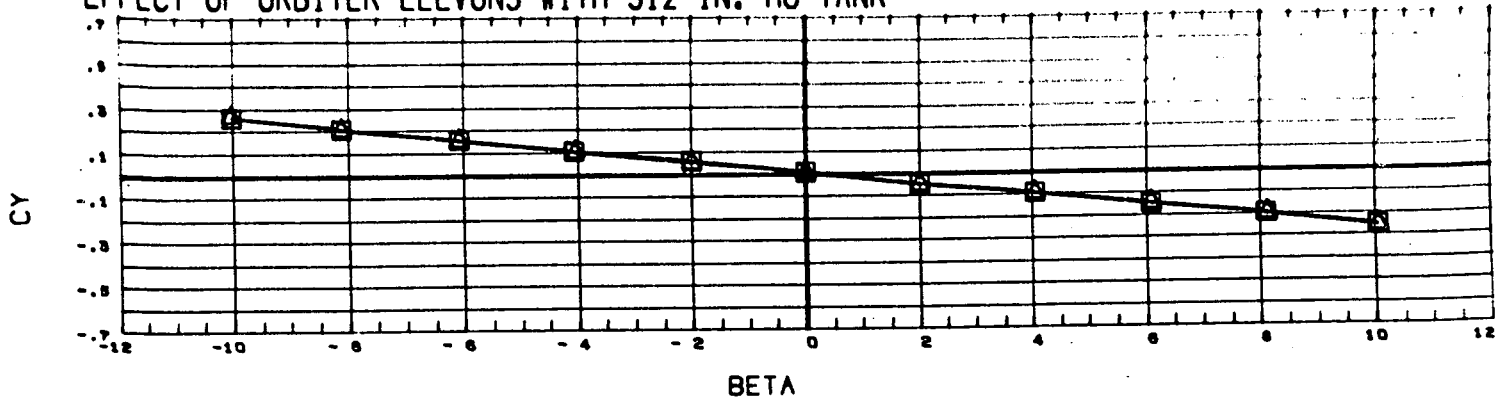


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

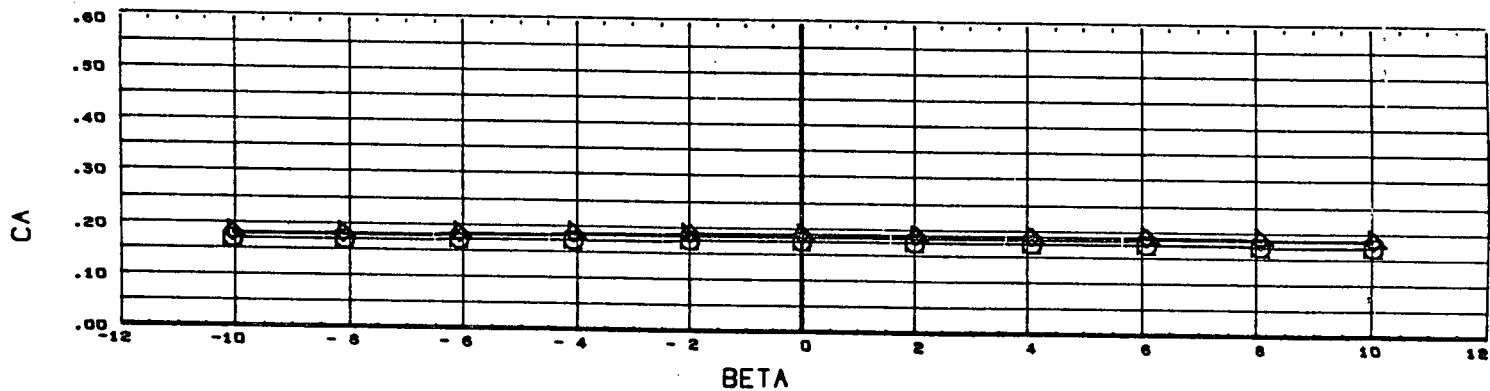
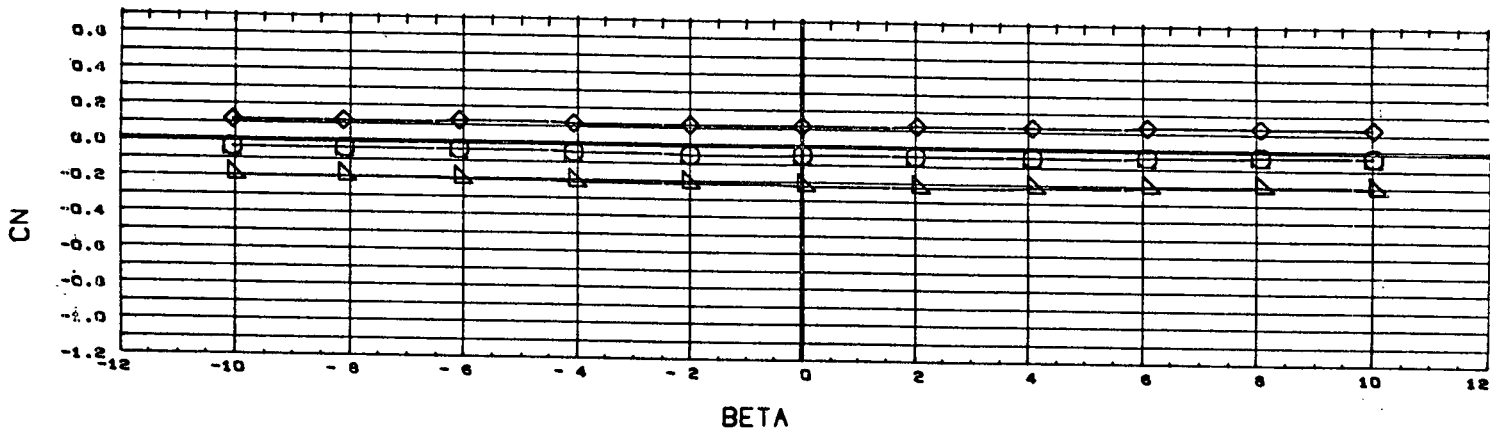
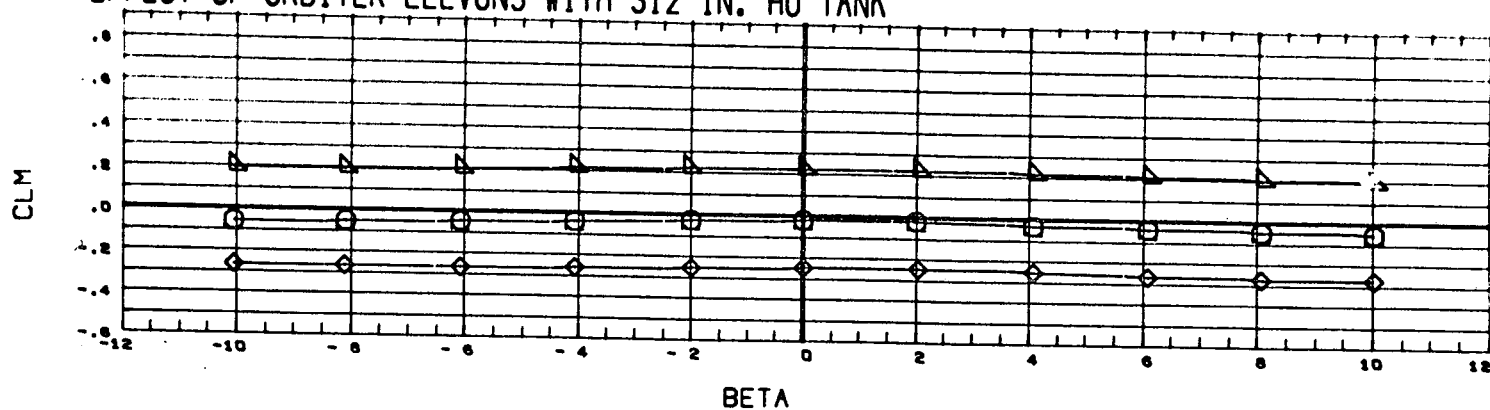


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMPP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMPP | 0.0000 IN. |
| (A71148) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMPP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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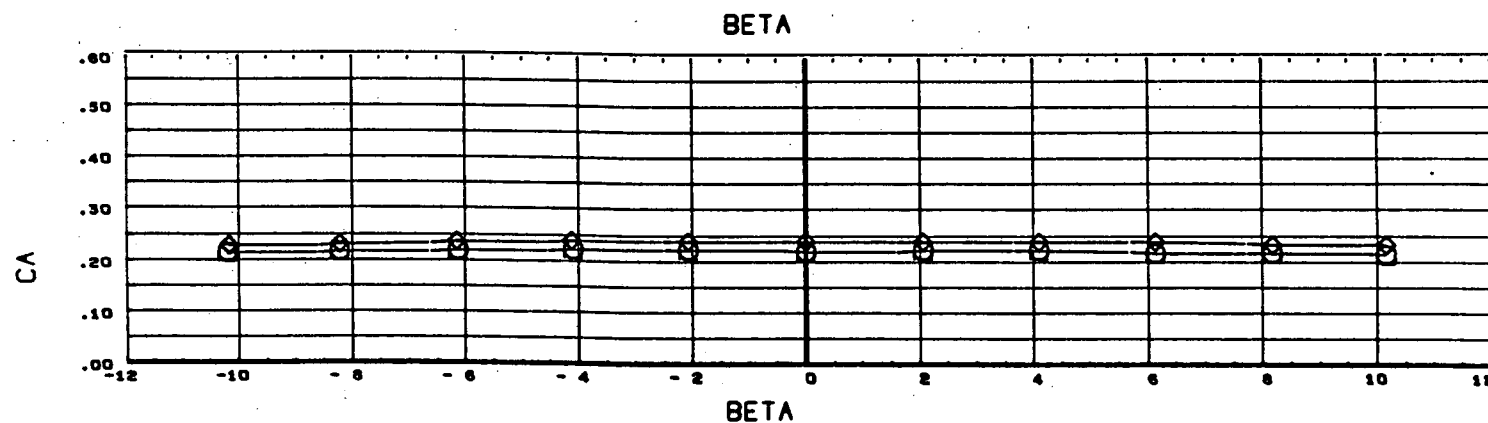
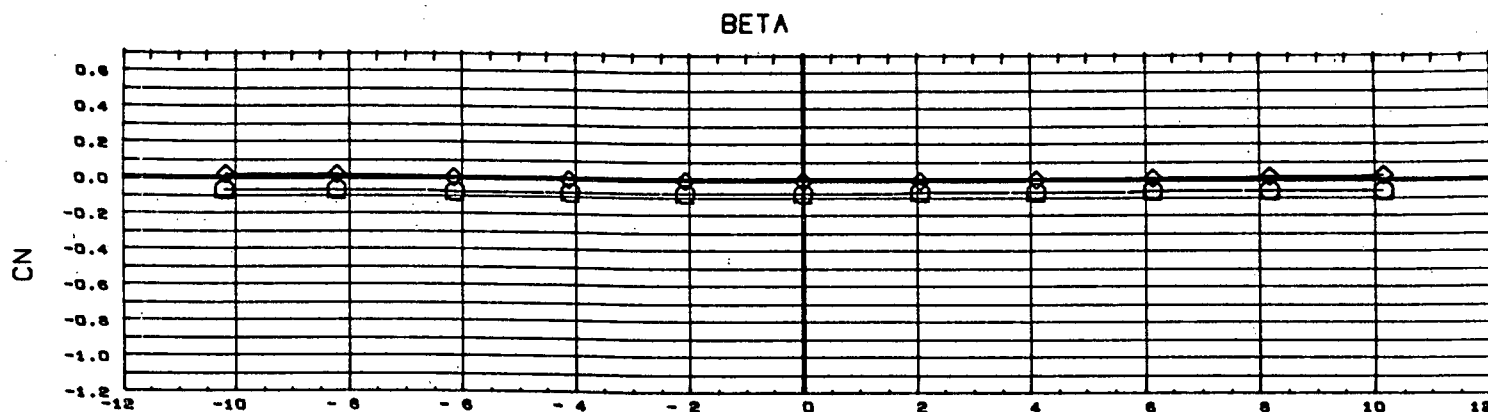
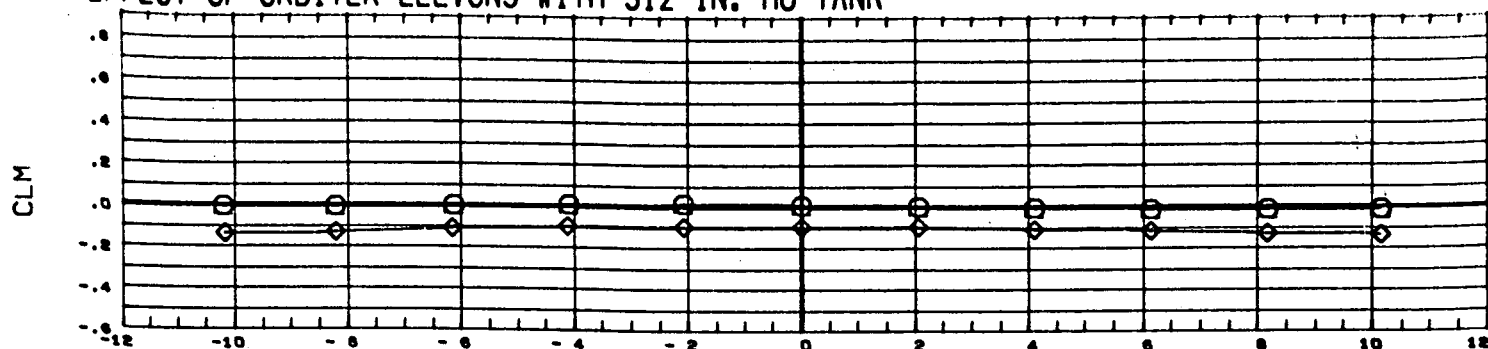
EFFECT OF ORBITER ELEVONS WITH 312 IN. H₂ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71144) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

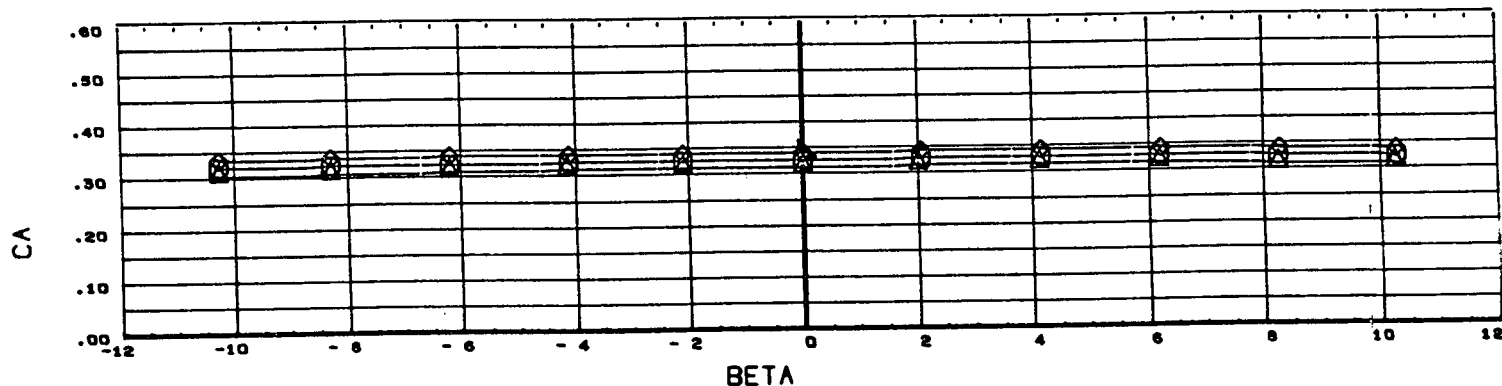
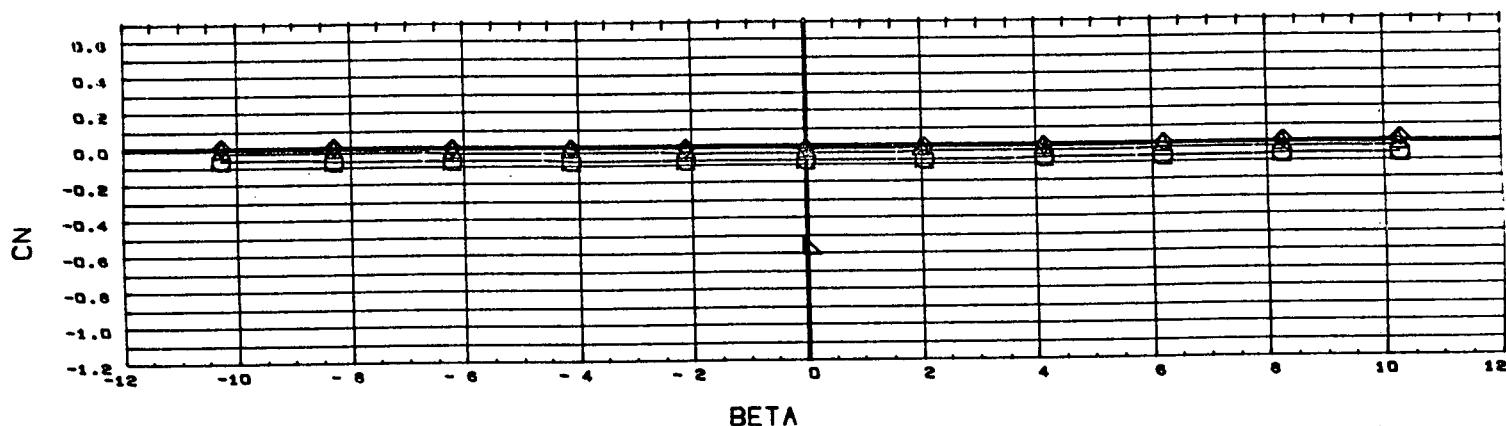
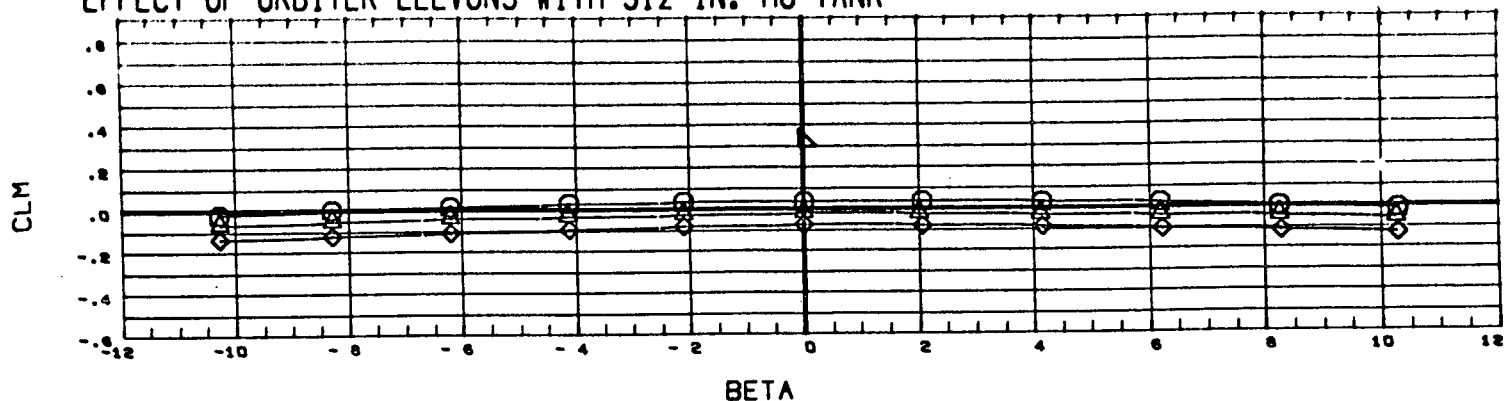
EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71144) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .91

EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

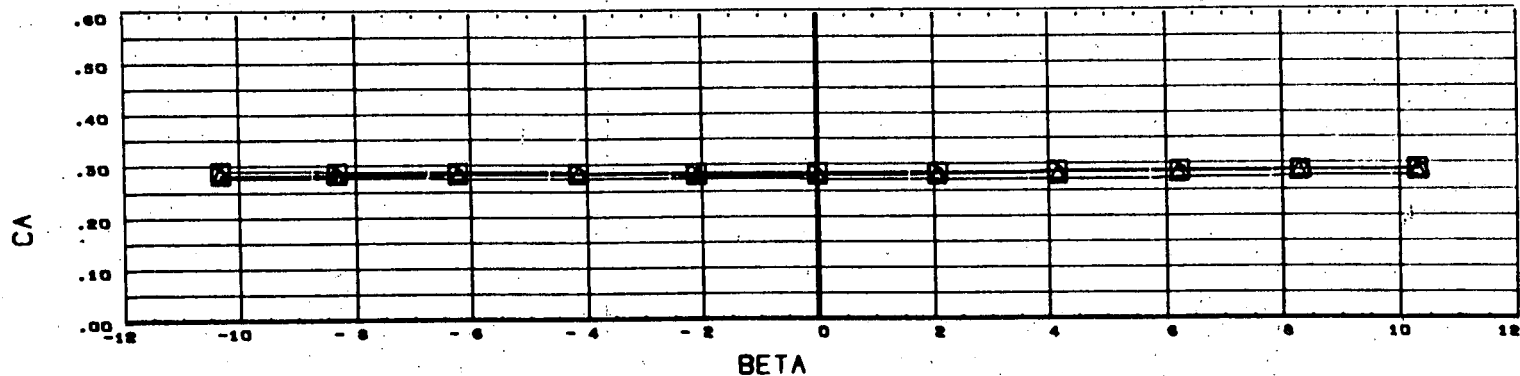
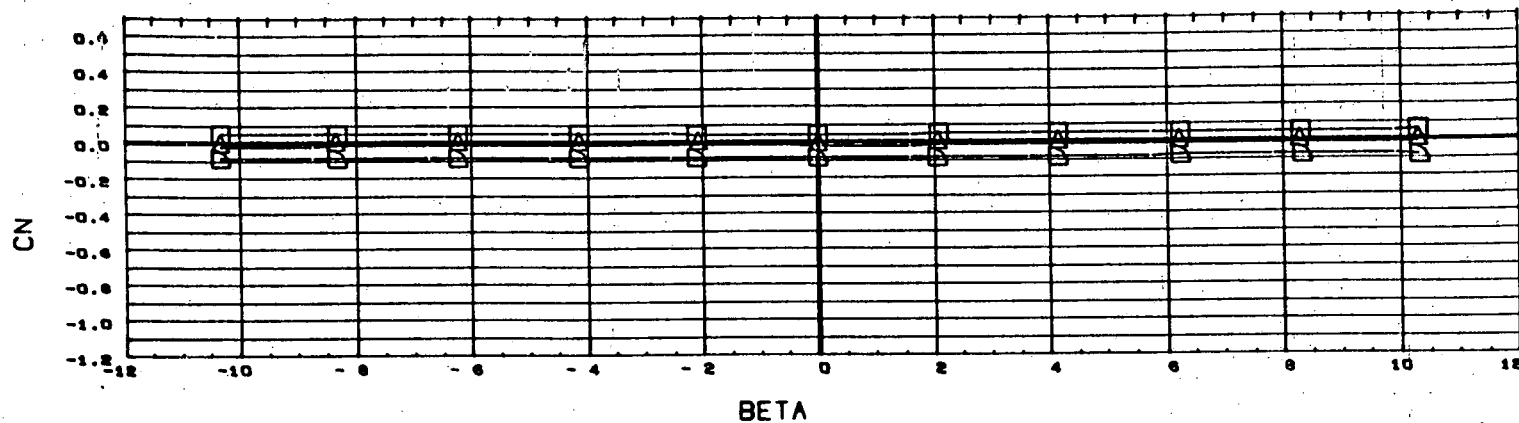
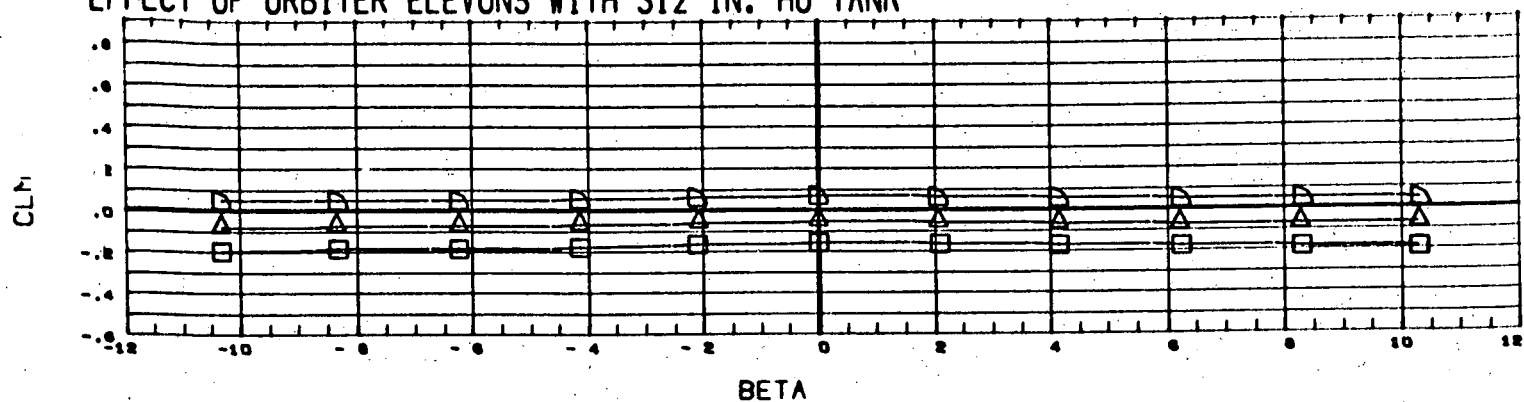


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71144) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.19

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK



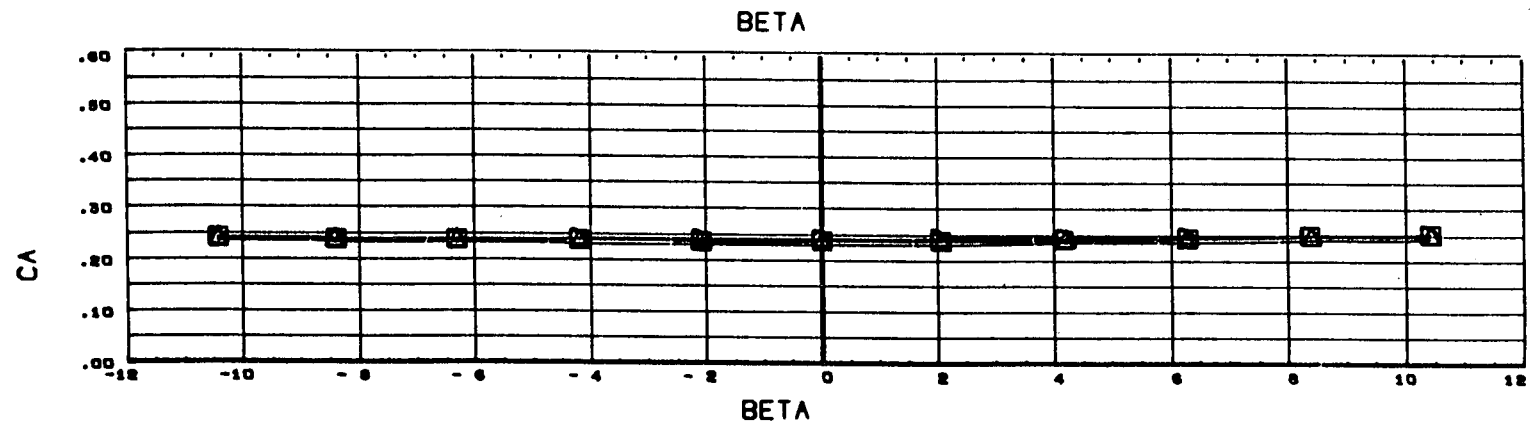
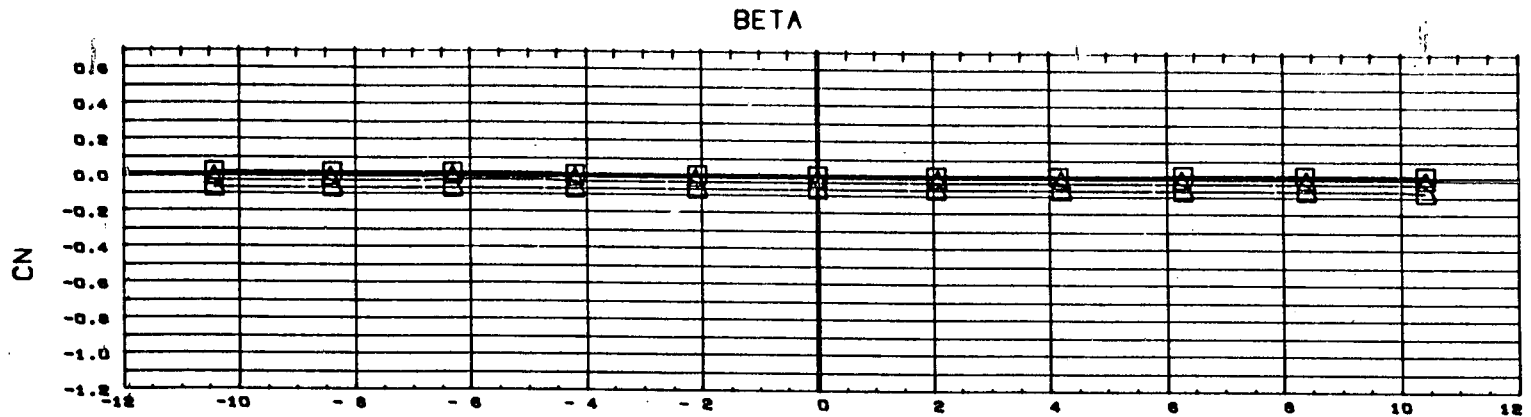
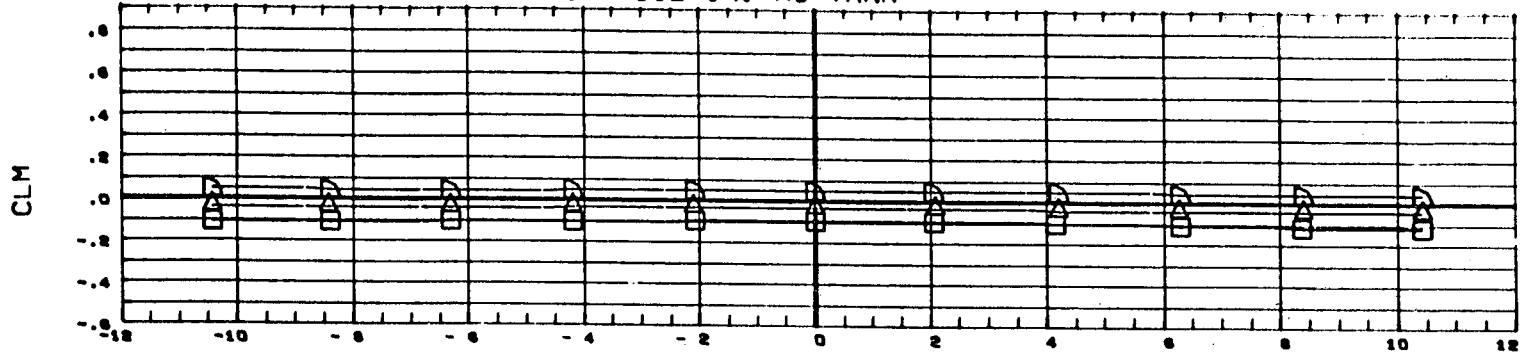
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

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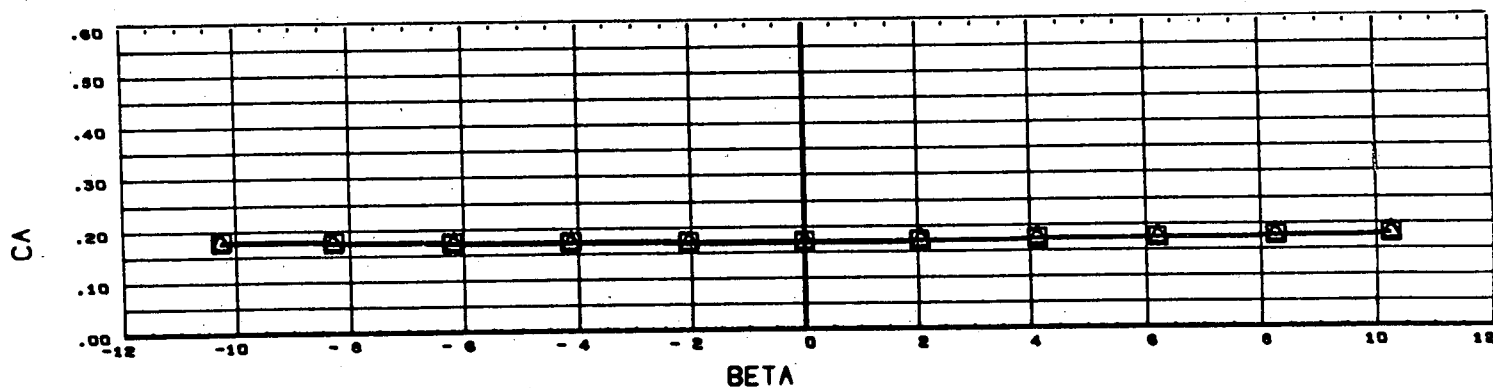
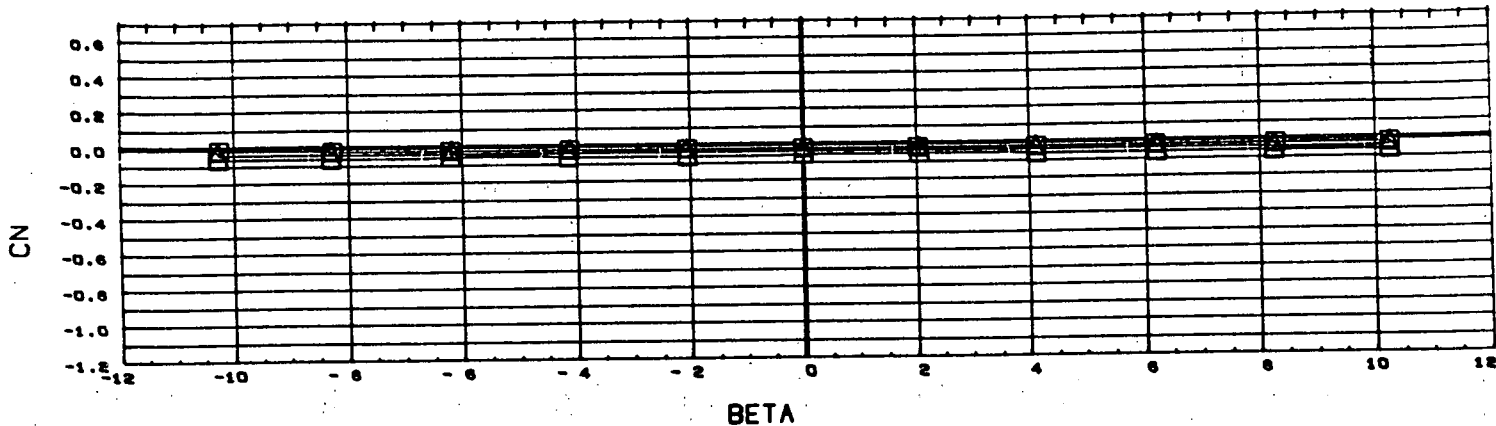
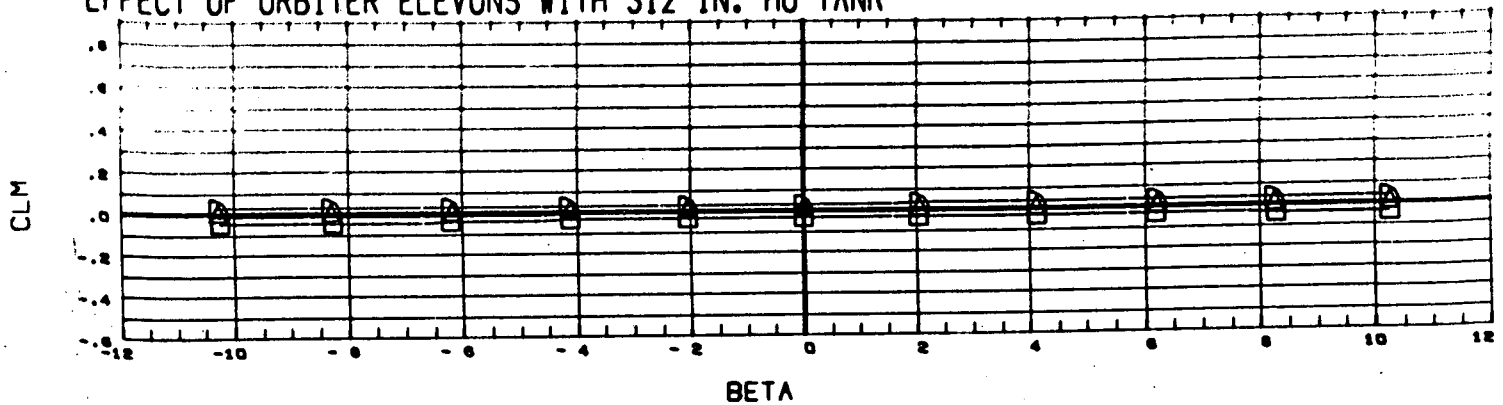
EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71134) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 IN. |
| (A71142) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

EFFECT OF ORBITER ELEVONS WITH 312 IN. H₀ TANK

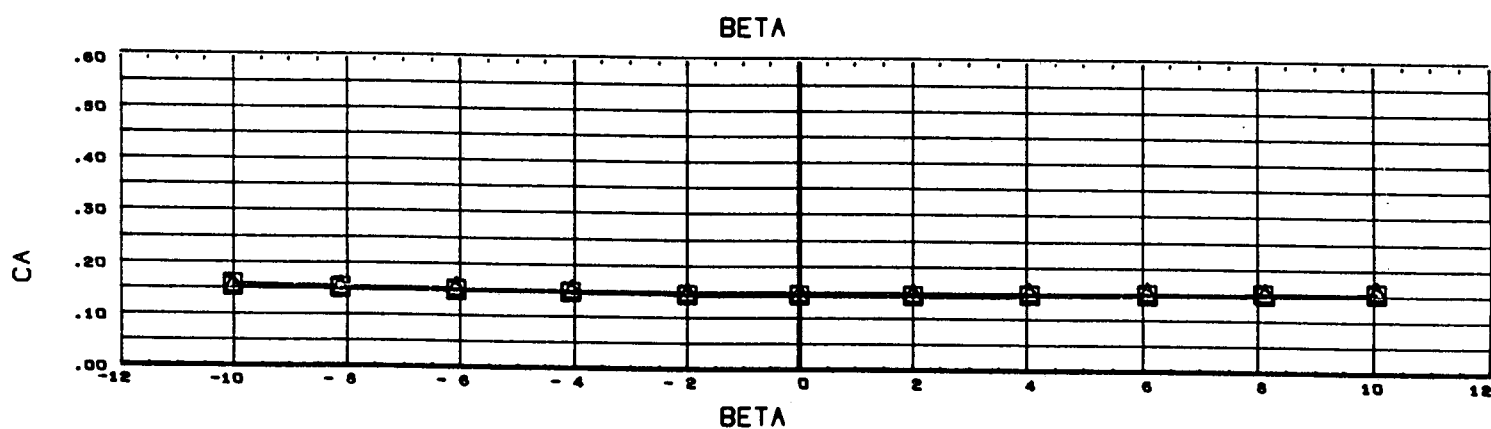
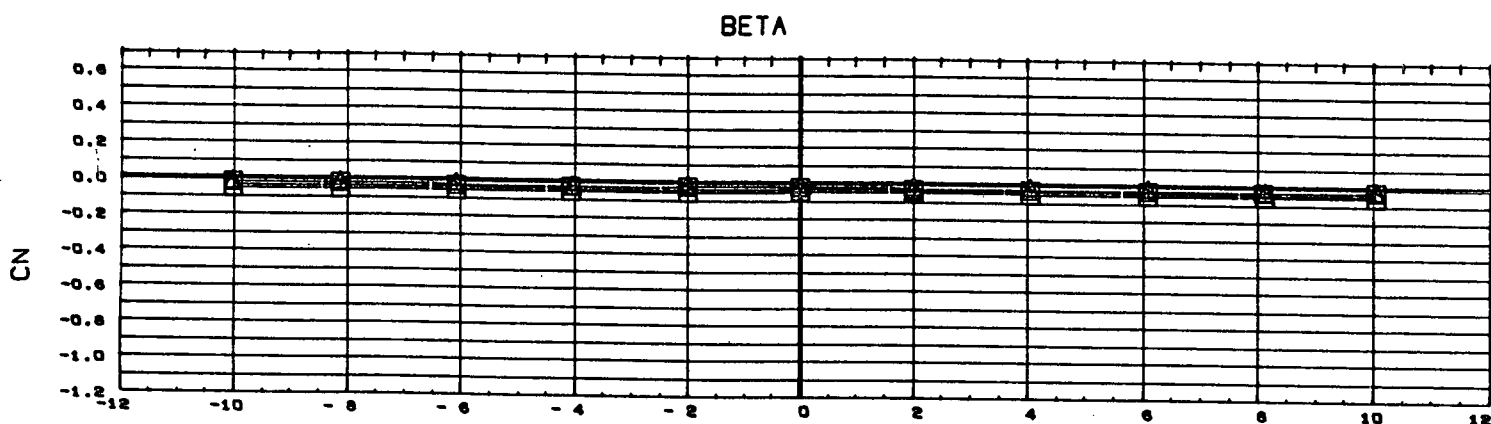
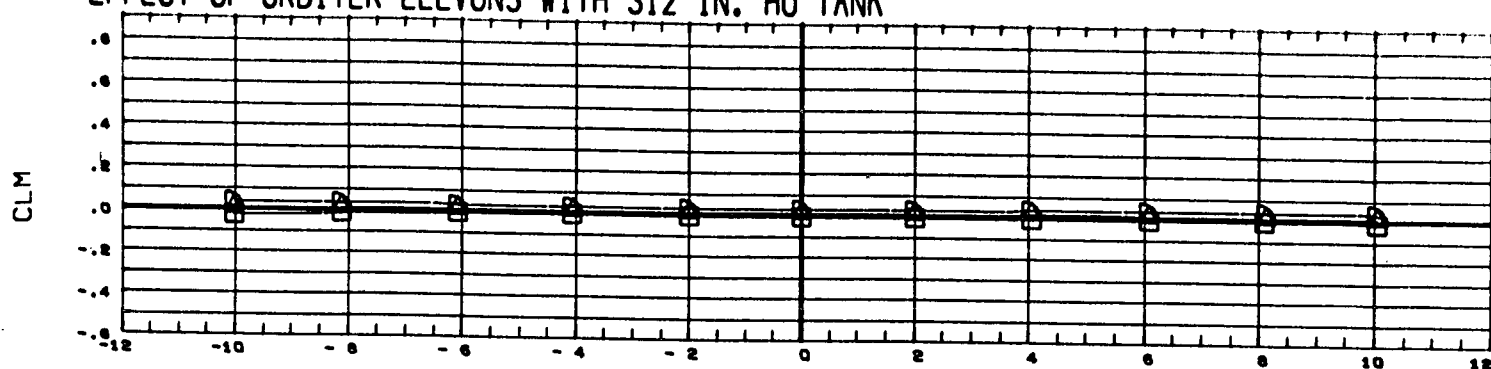


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|---------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | SREF | 4.4600 IN. |
| (A71142) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 IN. |
| (A71148) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER ELEVONS WITH 312 IN. HO TANK

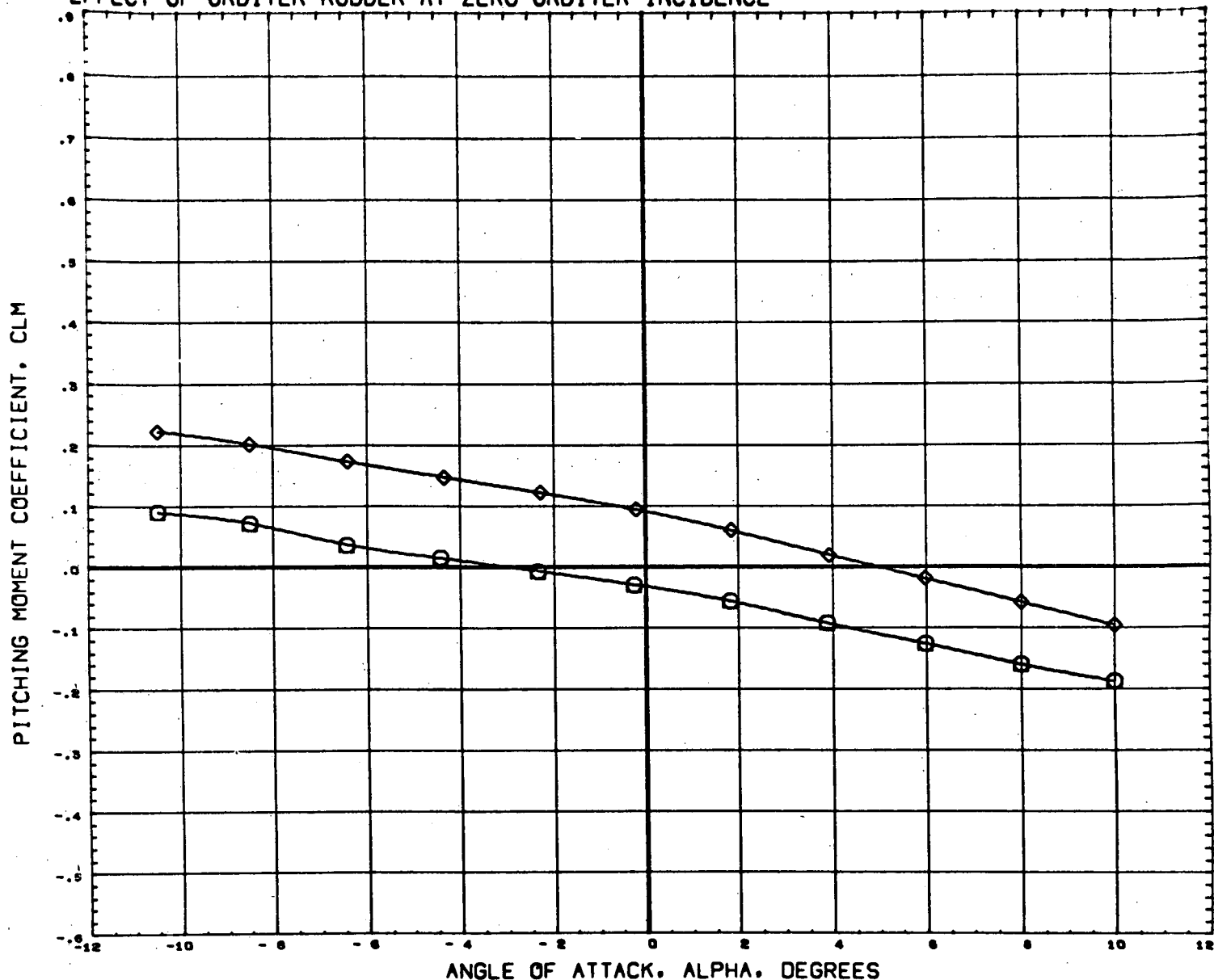


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|---------|--------|-----------------------|--------|--------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ.IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (A71144) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 10.000 | 0.000 | BREF | 4.4600 | IN. |
| (A71142) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 10.000 | 0.000 | XMRP | 3.3600 | IN. |
| (A71146) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | -10.000 | 0.000 | YMRP | 0.0000 | IN. |
| (A71146) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | -10.000 | 0.000 | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 4.96

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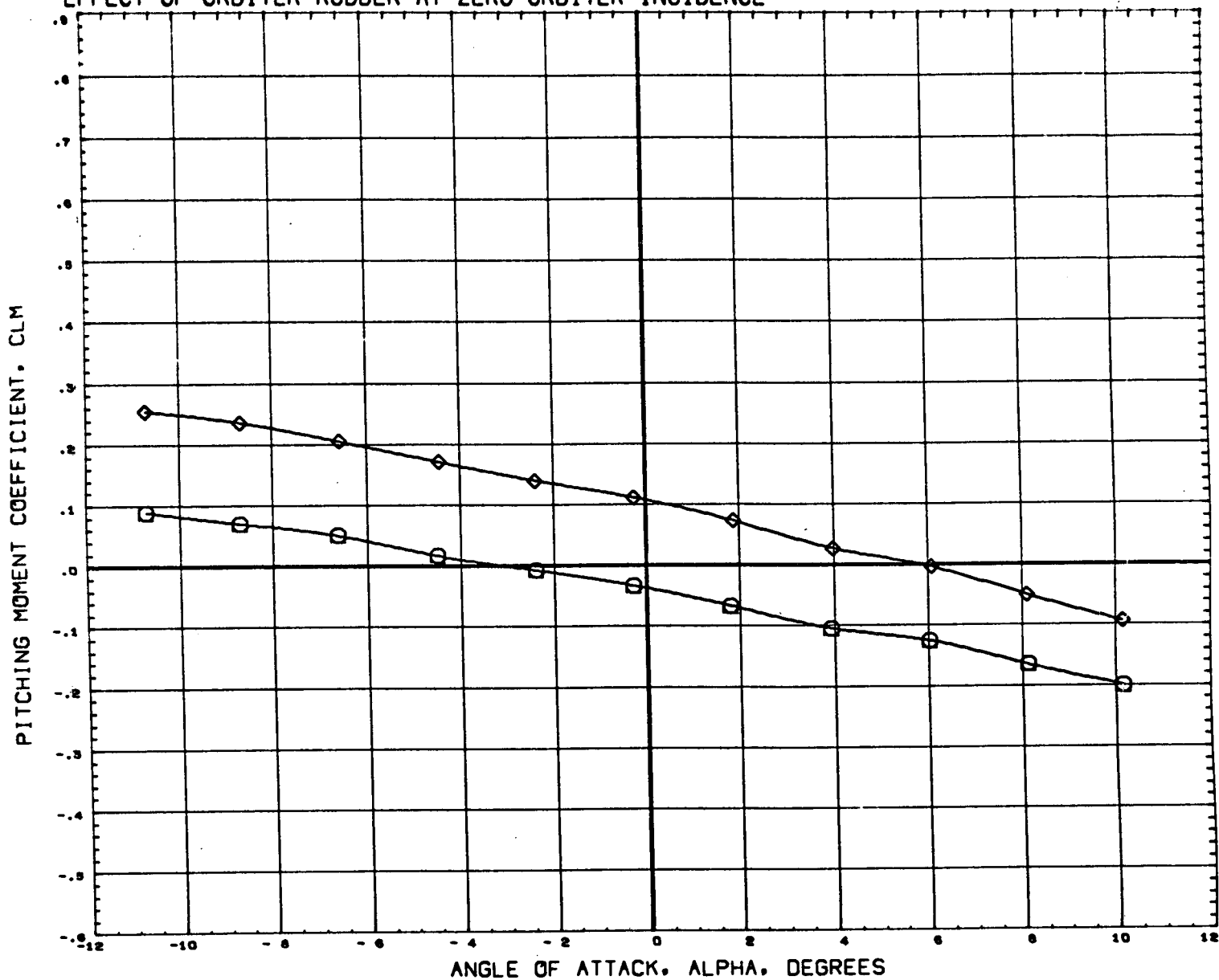
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ.IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



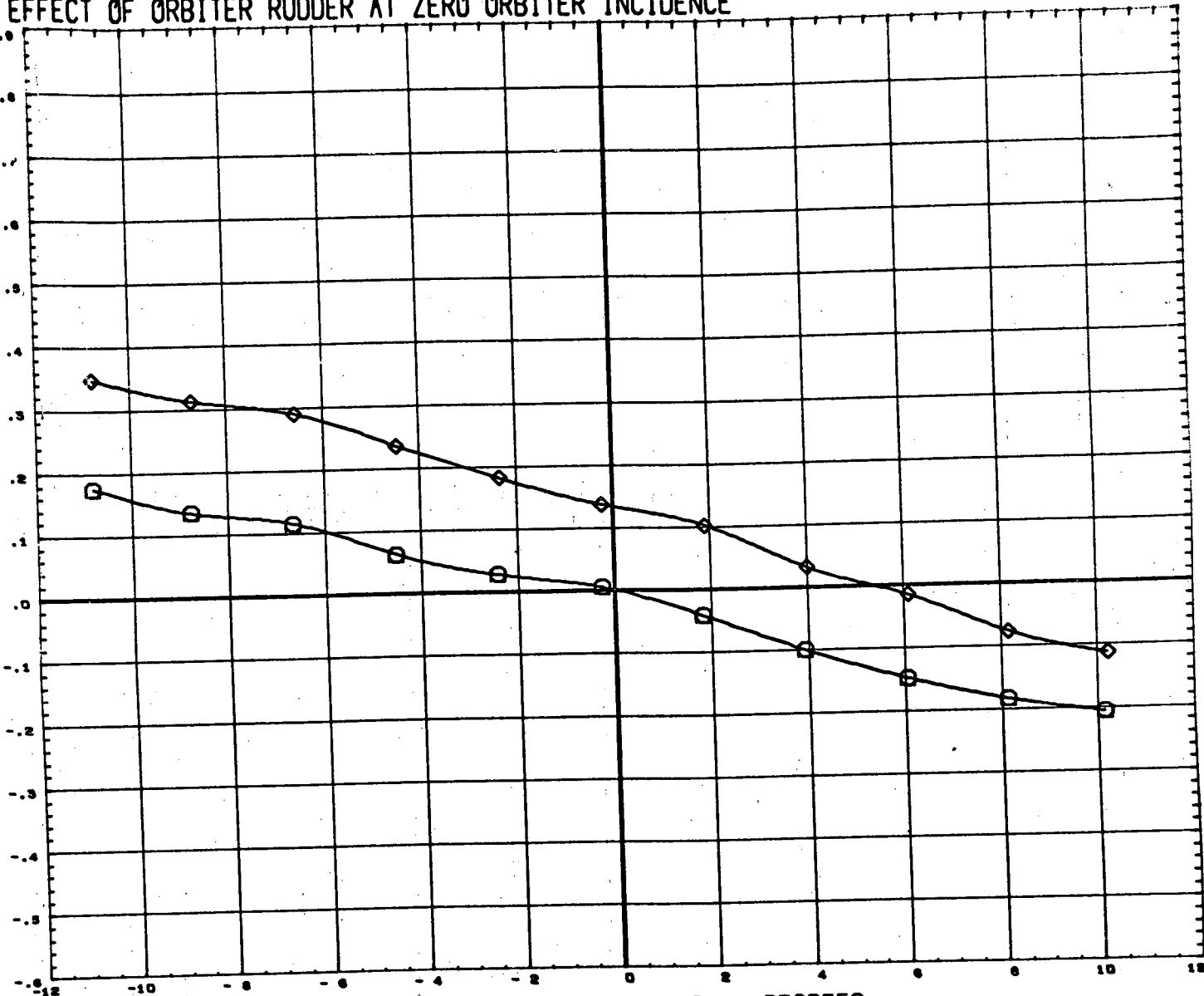
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

PAGE 420

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

PITCHING MOMENT COEFFICIENT, CLM



ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | T301S1 |
|-----------------|---------------------------------------|--------|
| (B71089) | HSFC TWT 544X LAUNCH VEHICLE STUDIES | |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71095) | HSFC TWT 544X LAUNCH VEHICLE STUDIES | |
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |

| ORBINC | Y8 | ELEVTR | RUDDER |
|--------|-------|--------|--------|
| 0.000 | 0.023 | 0.000 | 0.000 |
| 0.000 | 0.023 | 0.000 | 0.000 |
| 0.000 | 0.023 | 0.000 | 30.000 |
| 0.000 | 0.023 | 0.000 | 30.000 |

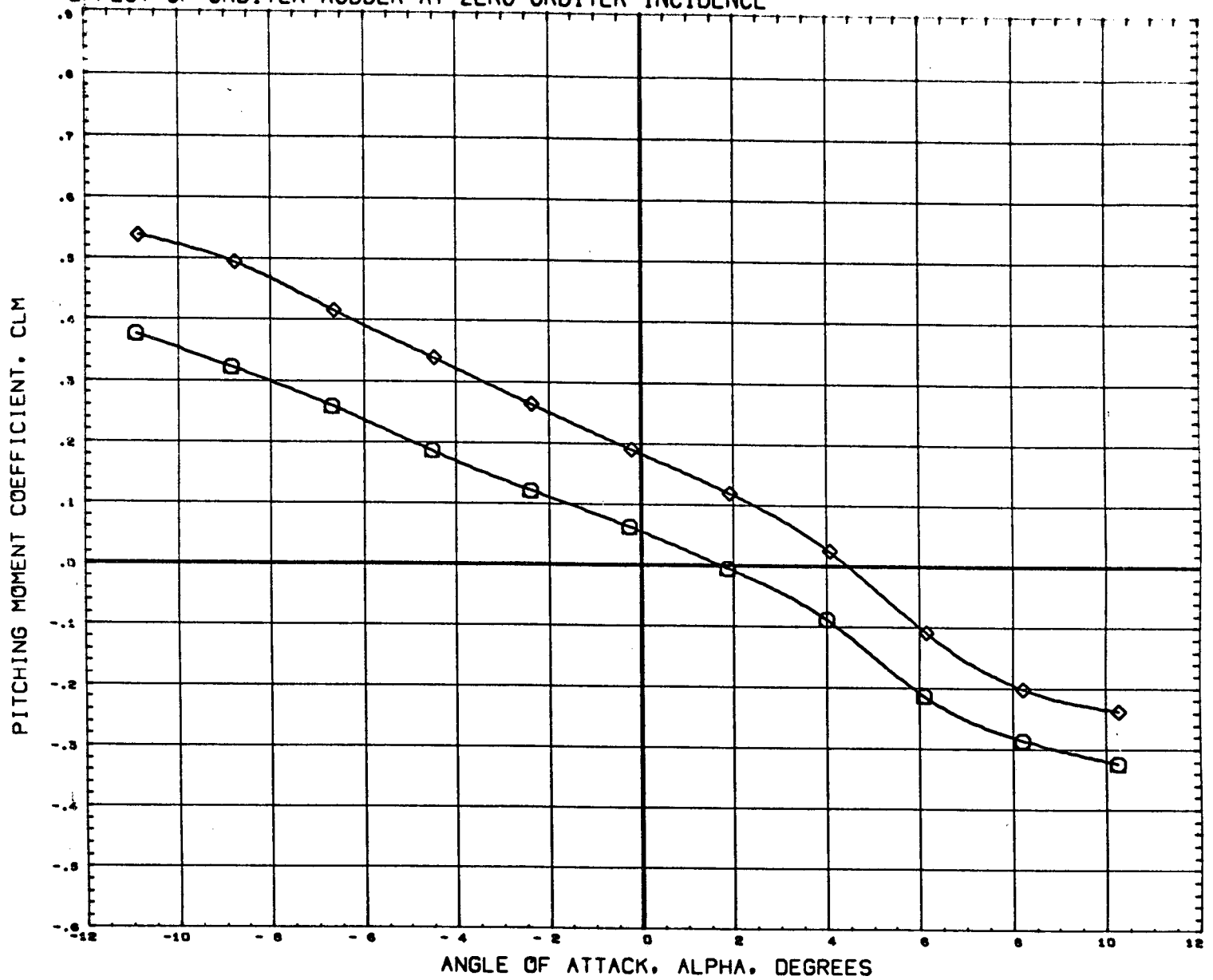
| REFERENCE INFORMATION | |
|-----------------------|----------------|
| SREF | 7.8800 SQ. IN. |
| LREF | 2.0280 IN. |
| BREF | 4.4600 IN. |
| XMRP | 3.3600 IN. |
| YMRP | 0.0000 IN. |
| ZMRP | 0.2480 IN. |
| SCALE | 0.0040 SCALE |

MACH

.90

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

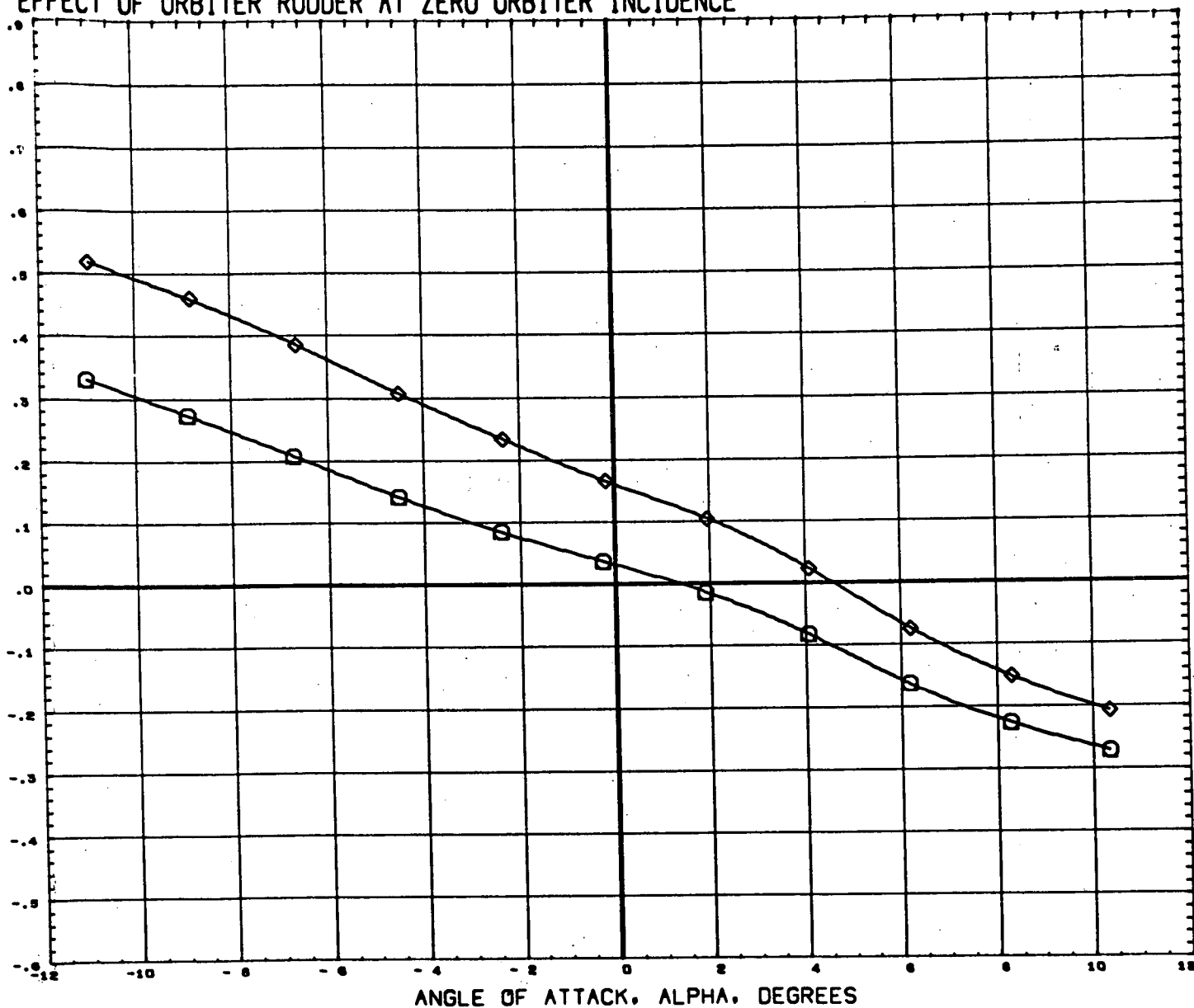


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.025 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.025 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

PITCHING MOMENT COEFFICIENT, CLM



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|--|---|
| (871089)  | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 |
| (871091)  | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (871093)  | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 |
| (871095)  | DATA NOT AVAILABLE FOR ALL CONDITIONS |

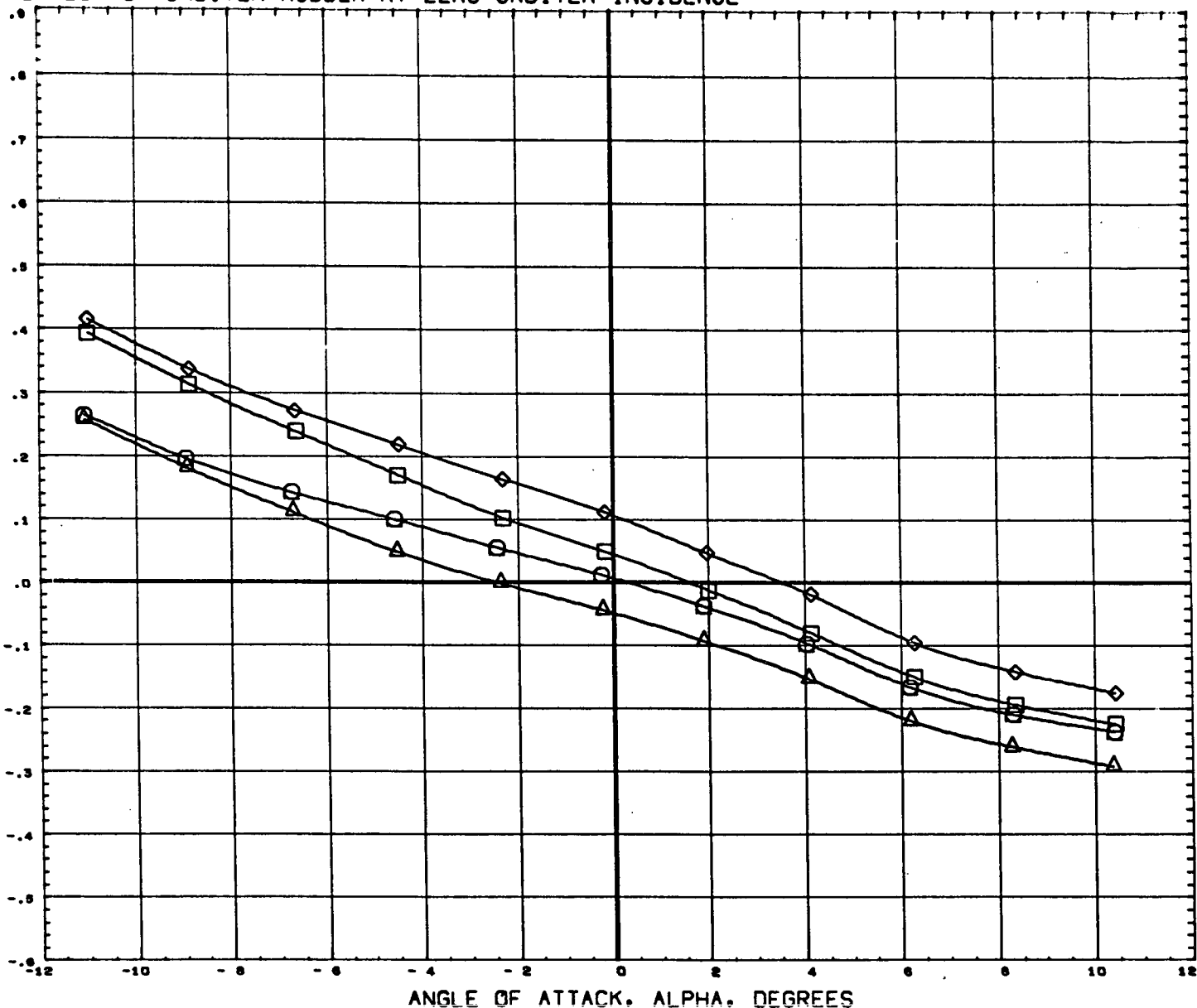
| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH

1.10

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

PITCHING MOMENT COEFFICIENT, CLM

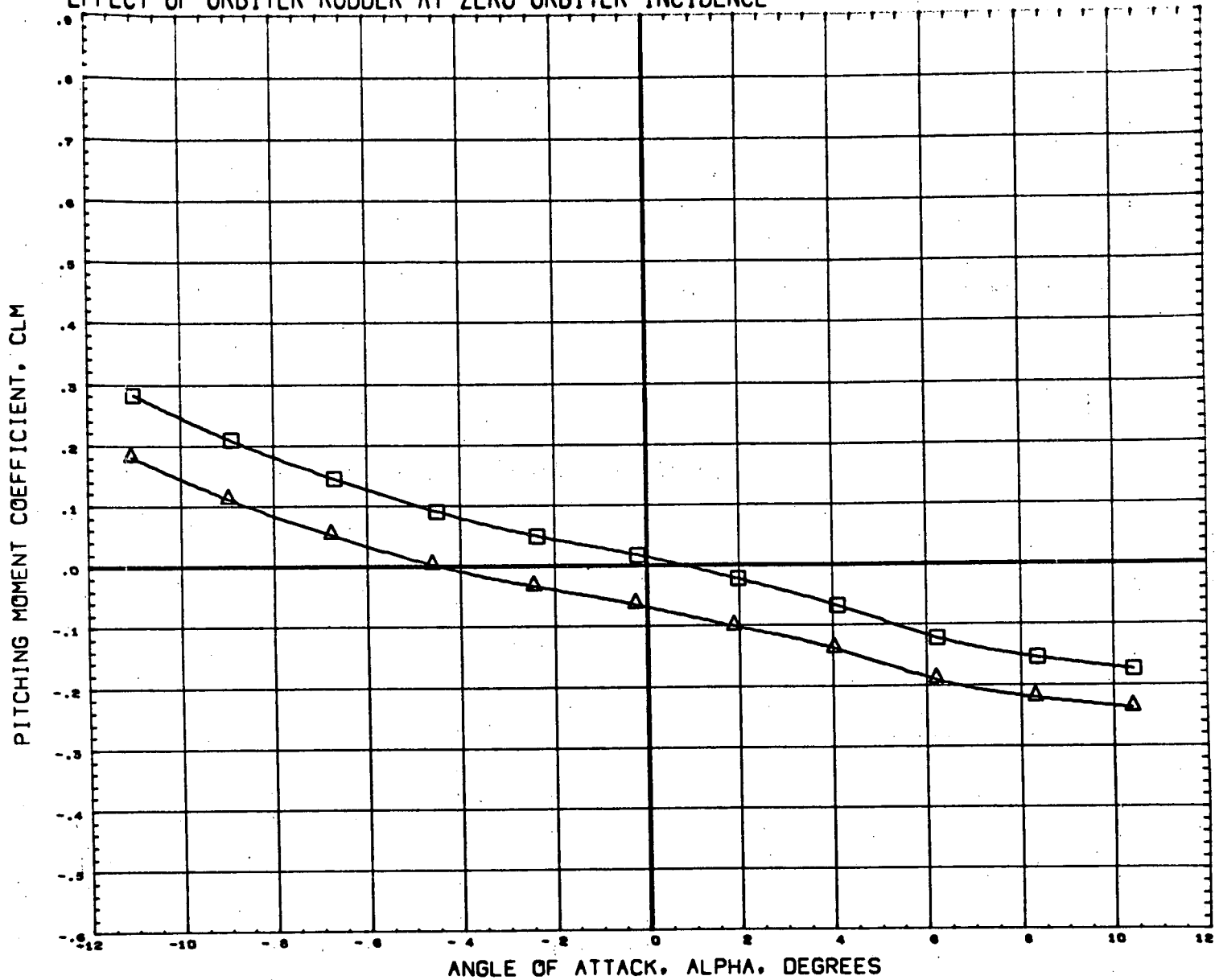


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

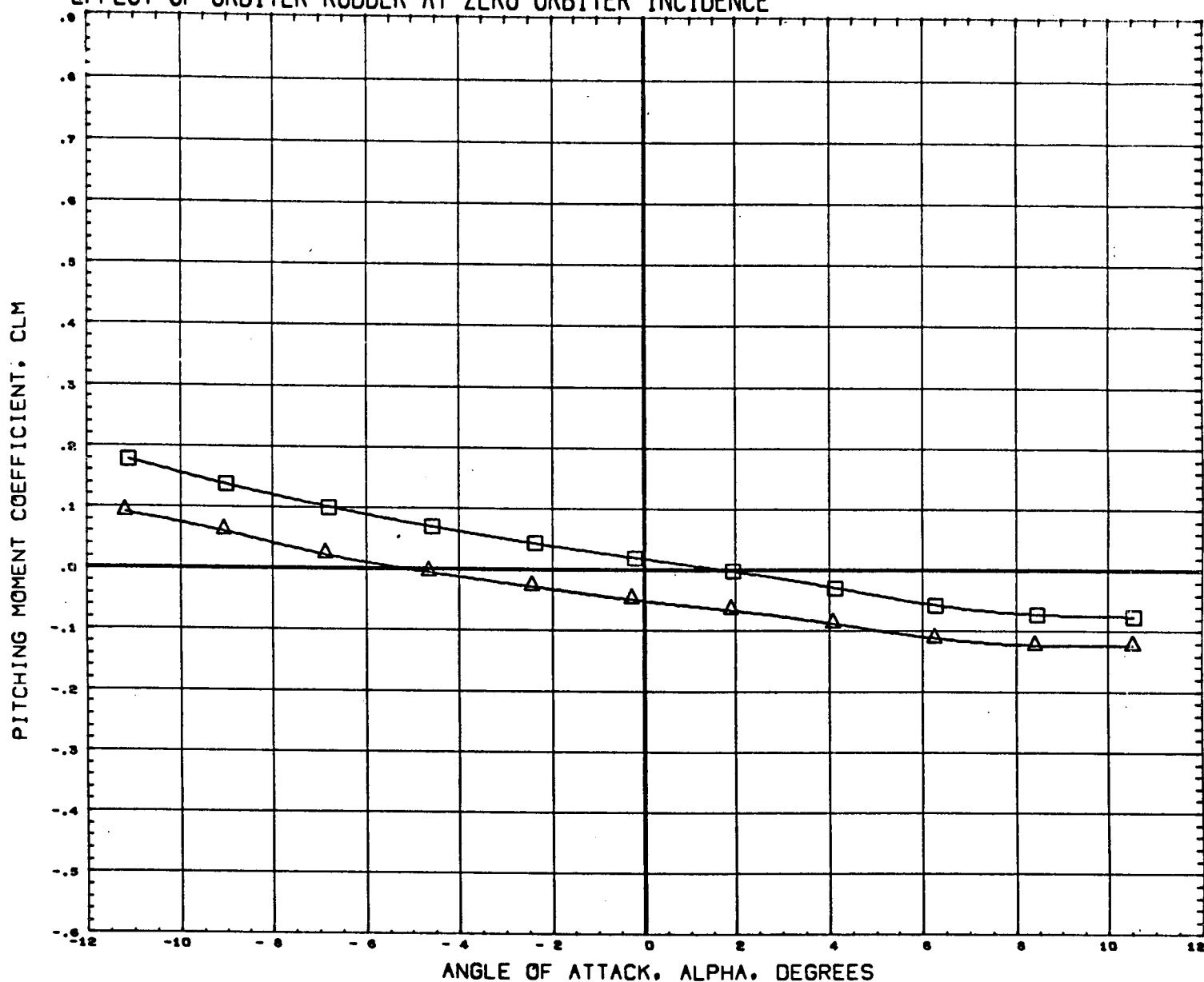


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

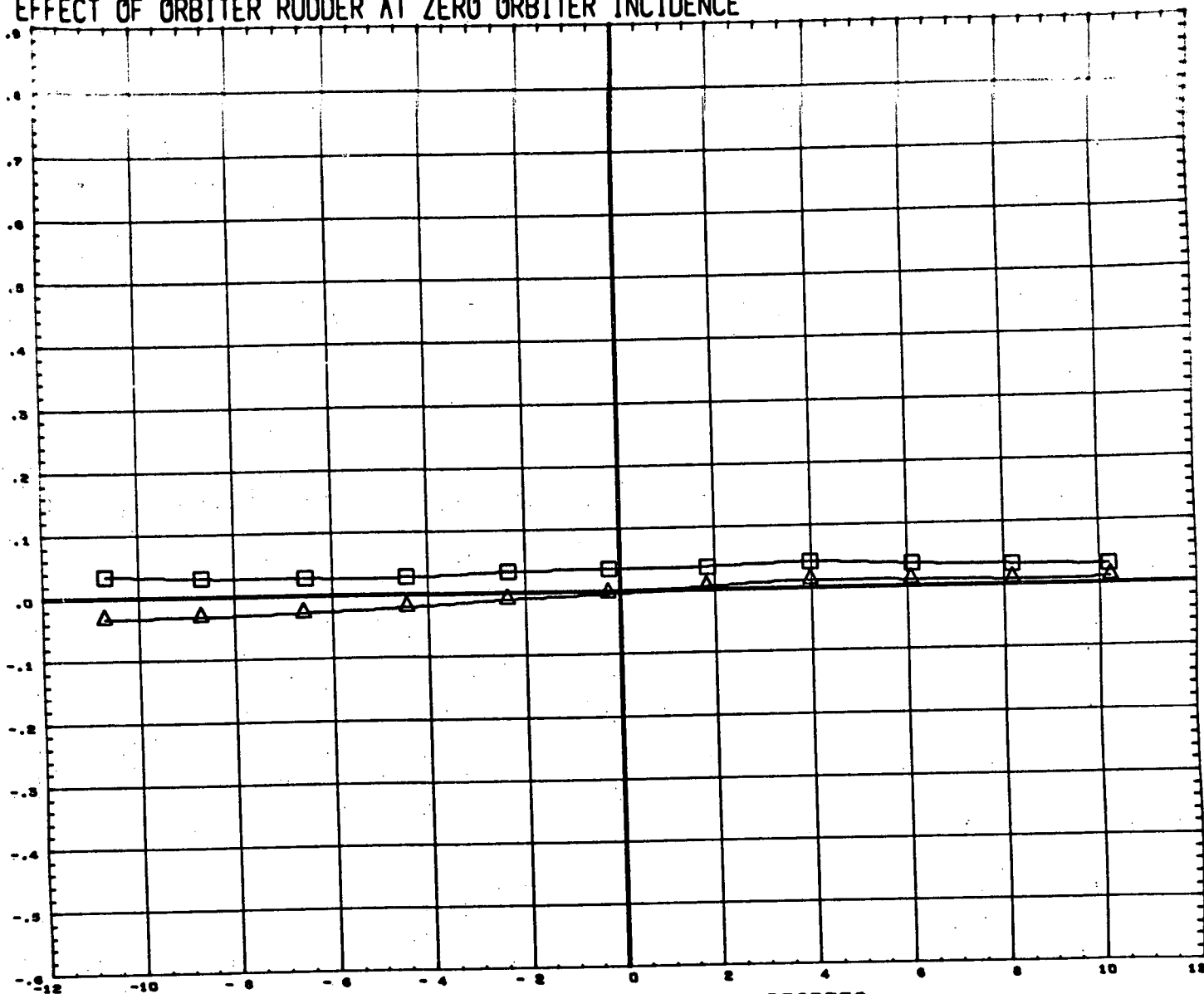


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.95

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

PITCHING MOMENT COEFFICIENT, CLM



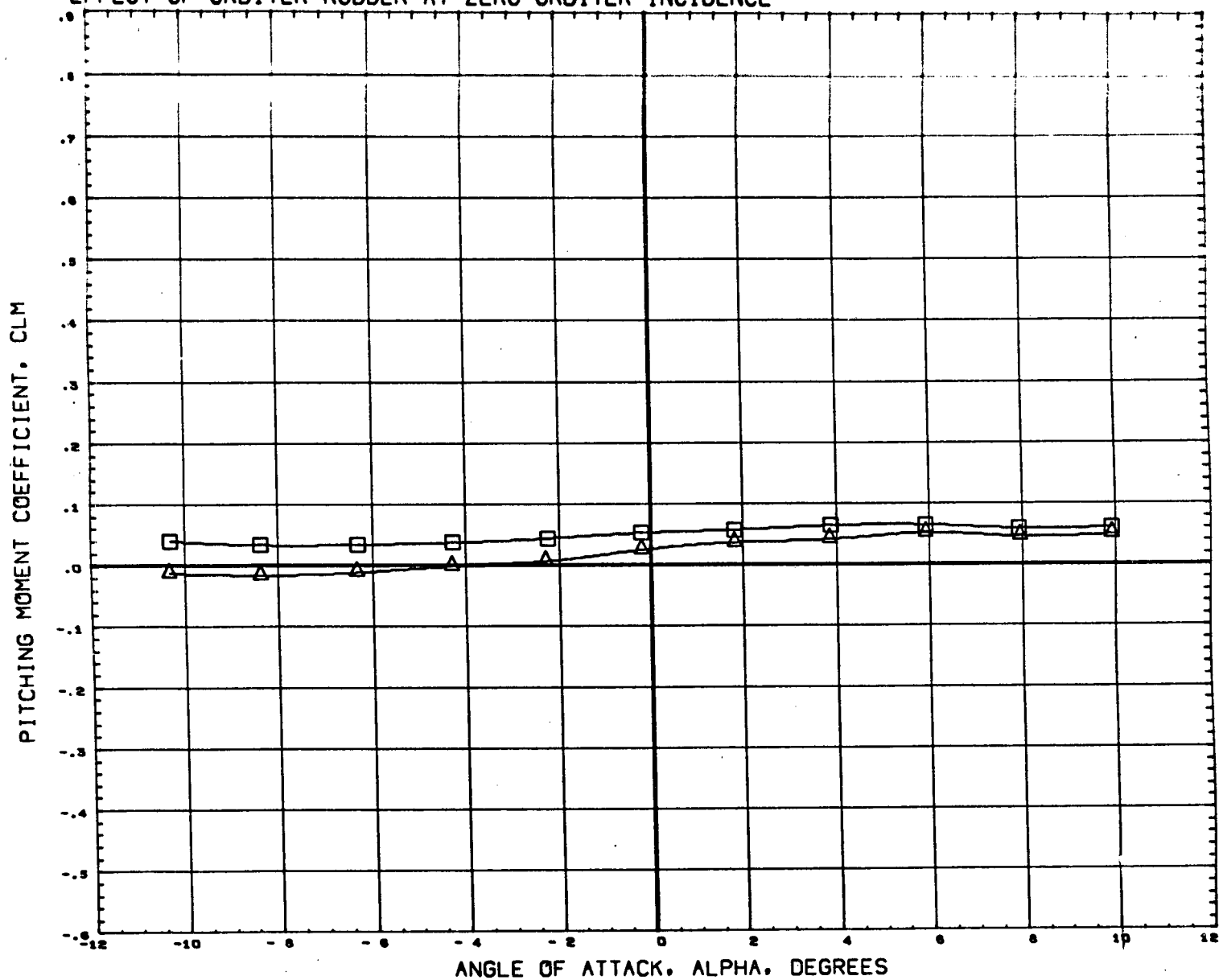
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH

3.48

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

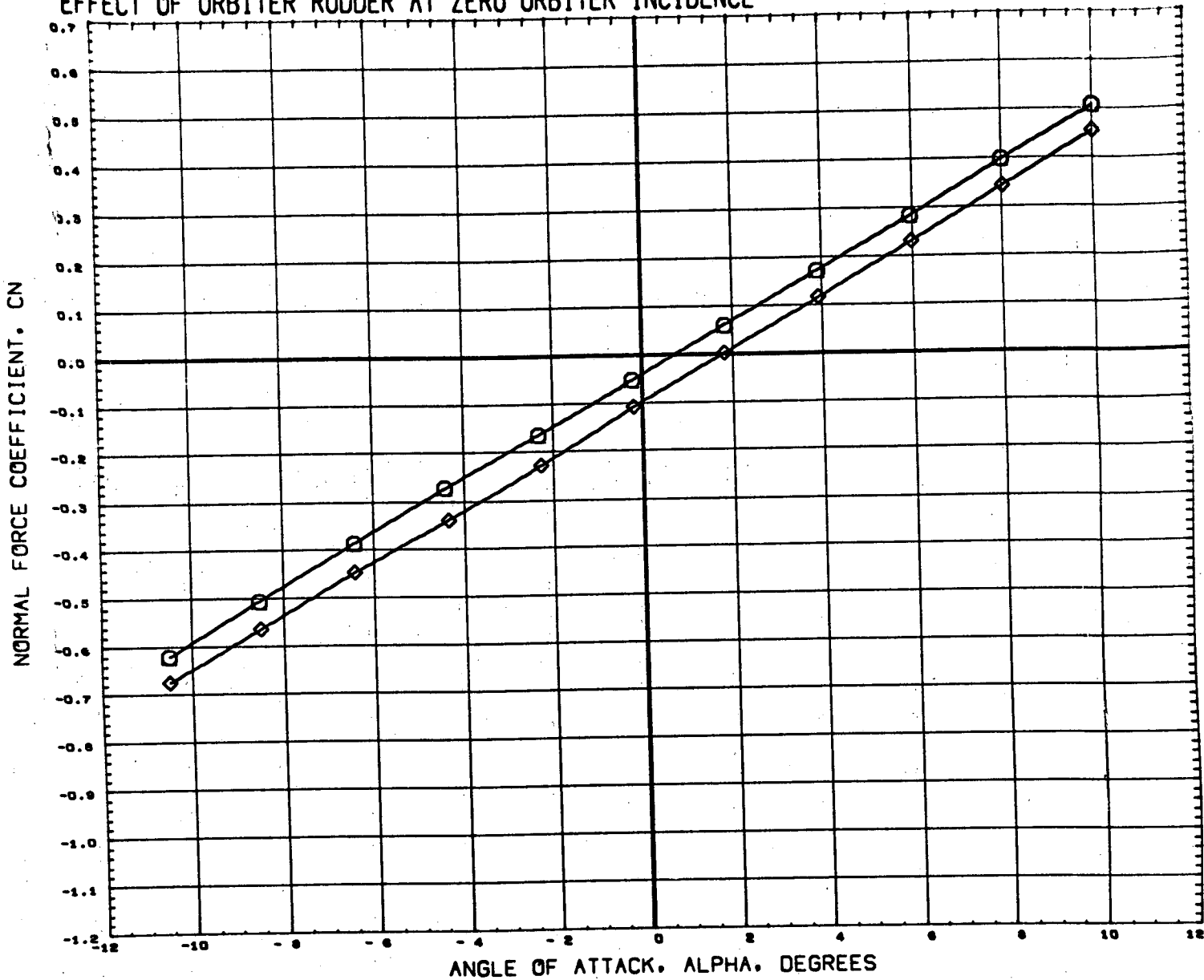


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71069) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 39. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

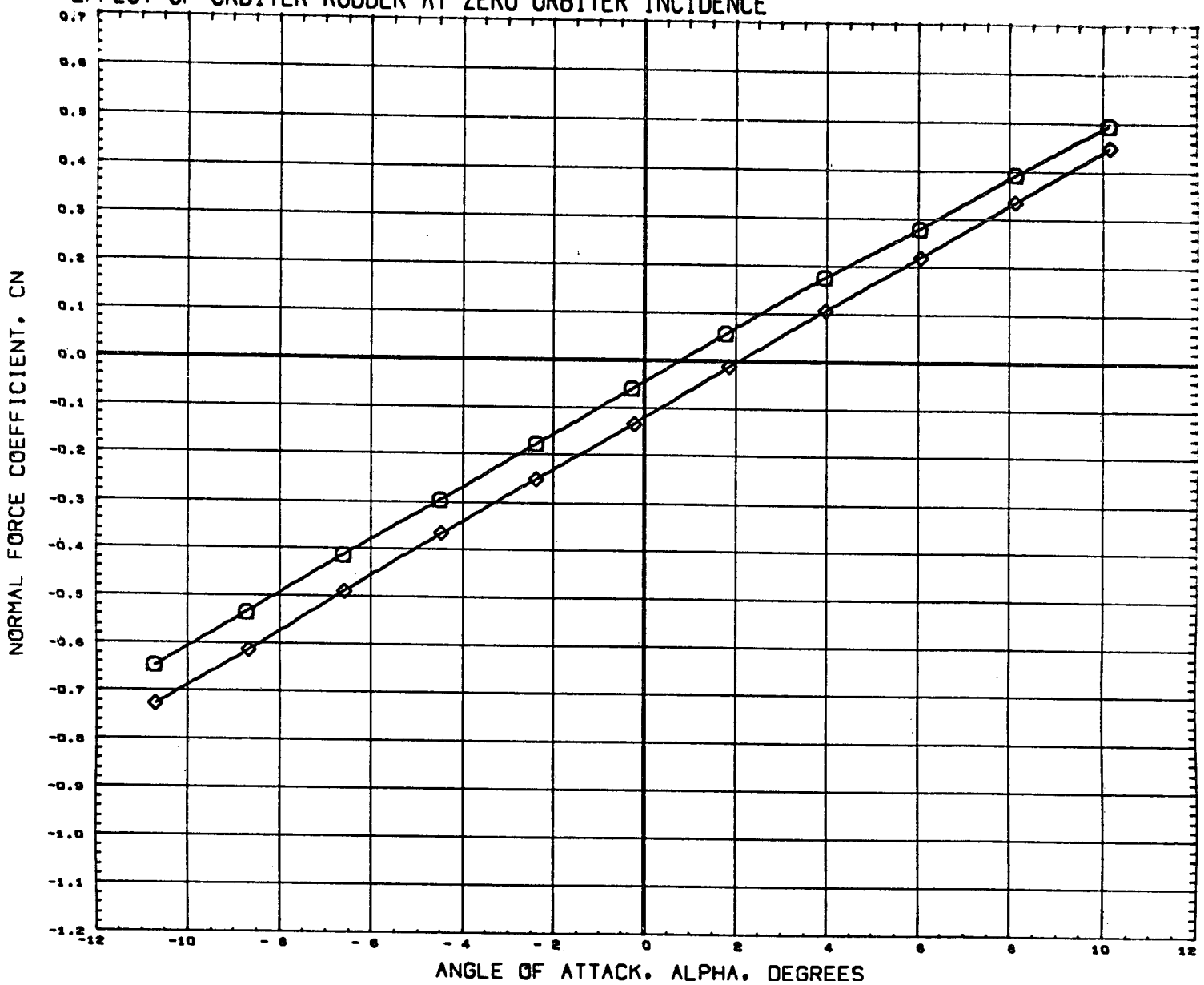


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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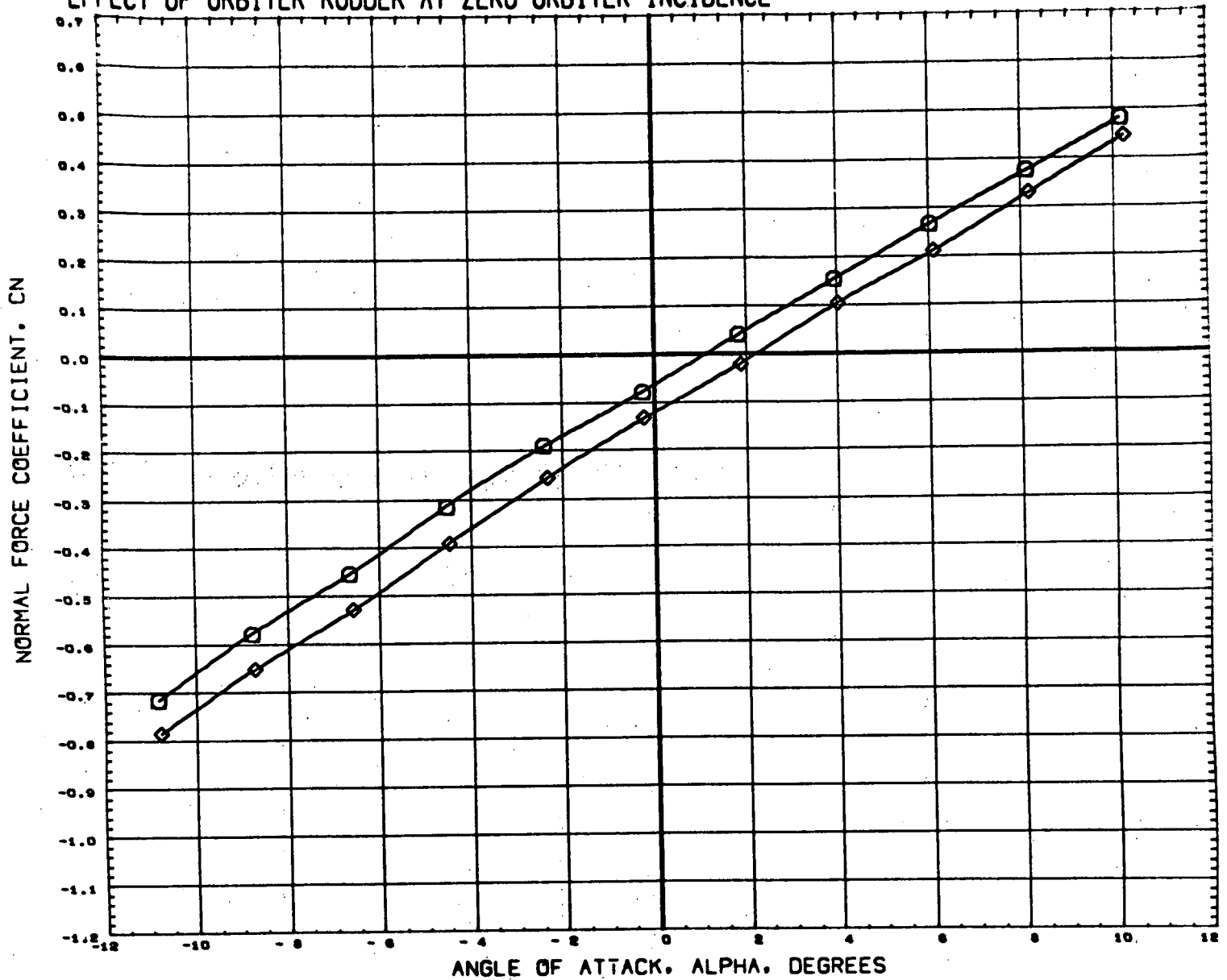
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH .80

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



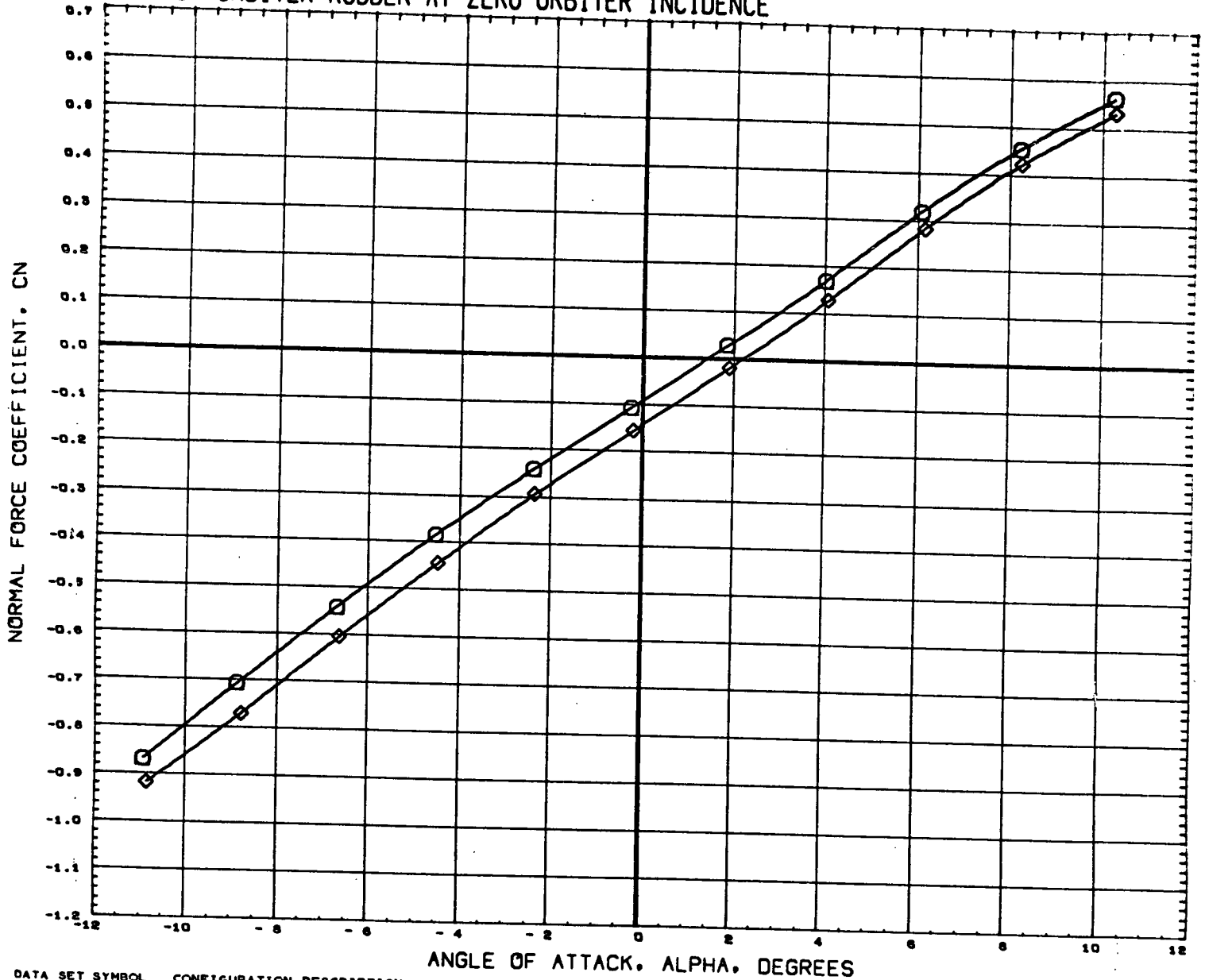
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | |
|-----------------|---------------------------------------|--------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T30151 |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T30151 |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |

| ORBITER | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|---------|-------|--------|--------|-----------------------|--------|---------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 30. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 | IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | YMRP | 0.0000 | IN. |
| | | | | ZMRP | 0.2460 | IN. |
| | | | | SCALE | 0.0040 | SCALE |

MACH

.90

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B71089) ○ MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131

(B71091) △ DATA NOT AVAILABLE FOR ALL CONDITIONS

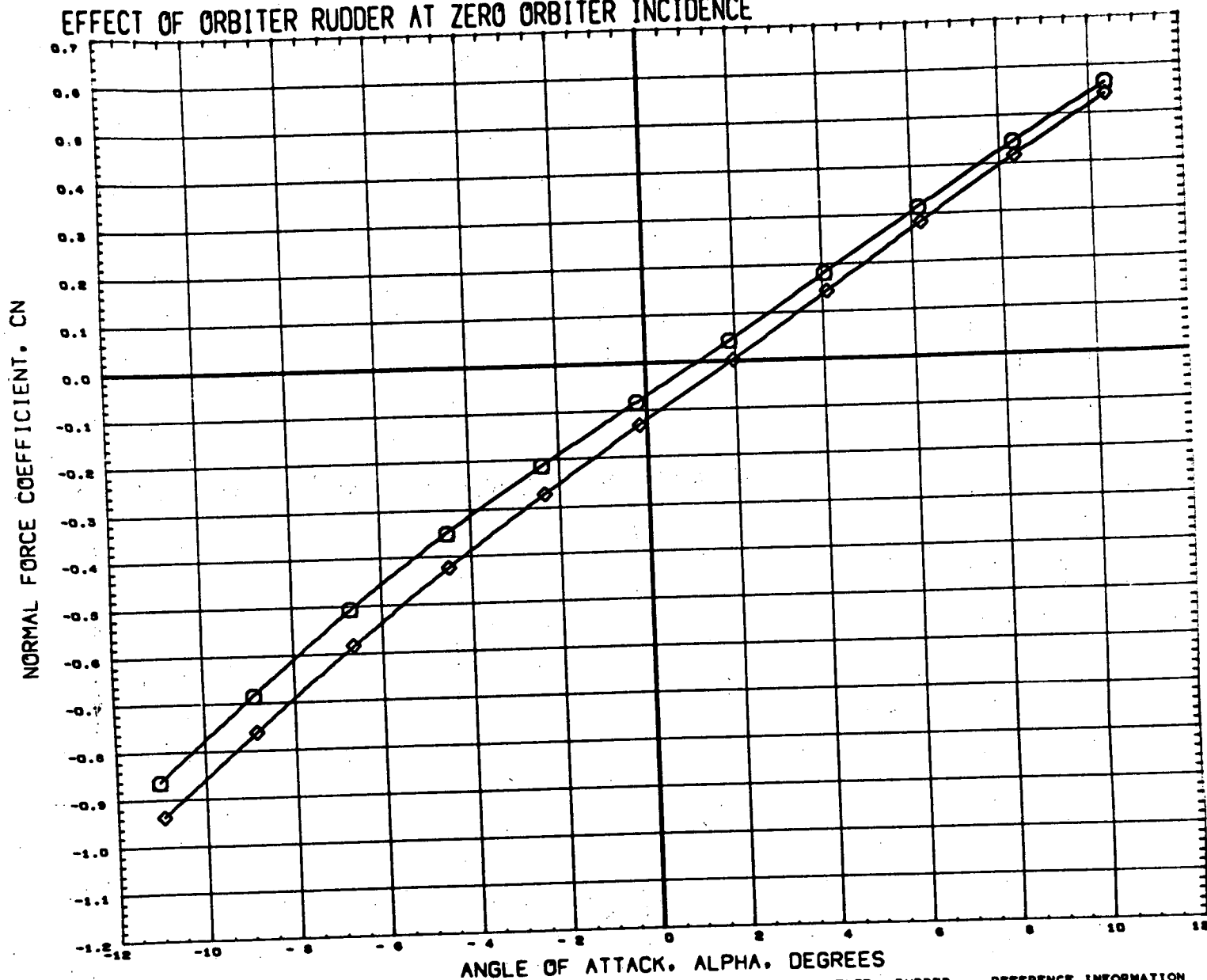
(B71095) ◇ MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131

(B71093) □ DATA NOT AVAILABLE FOR ALL CONDITIONS

| ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|---------|-------|--------|--------|-----------------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP 3.3600 IN. |
| | | | | YMRP 0.0000 IN. |
| | | | | ZMRP 0.2480 IN. |
| | | | | SCALE 0.0040 SCALE |

MACH 1.00

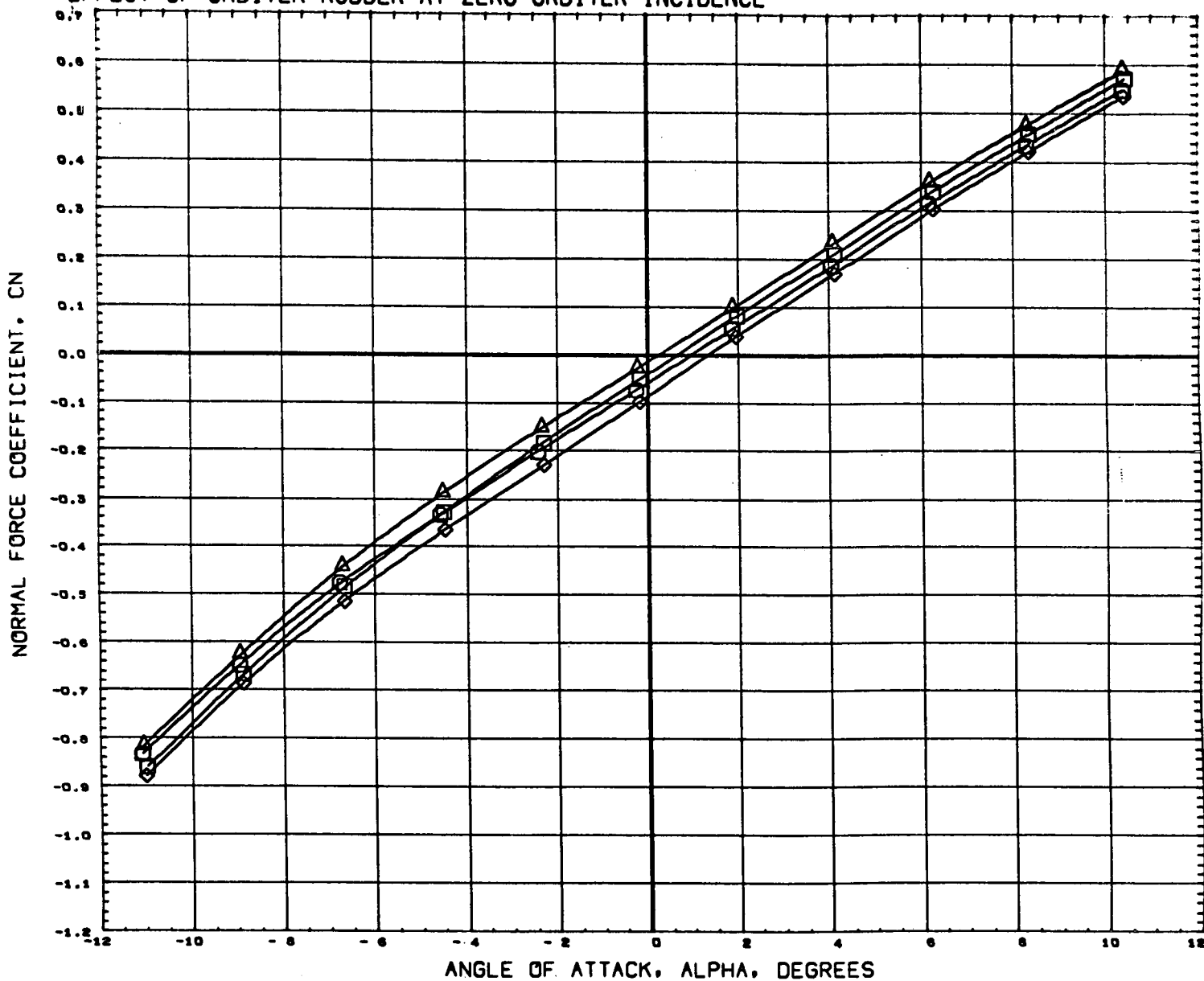
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

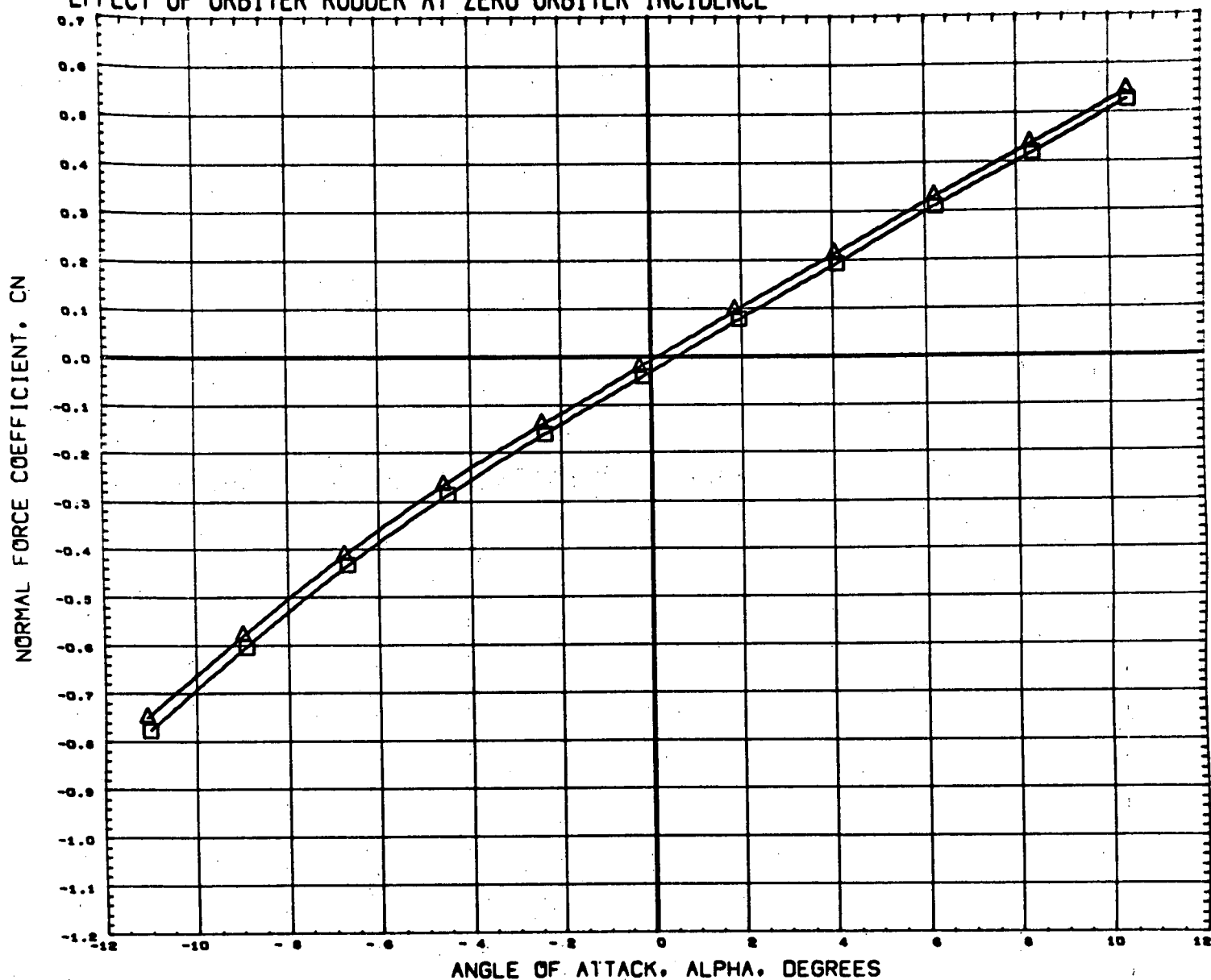


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



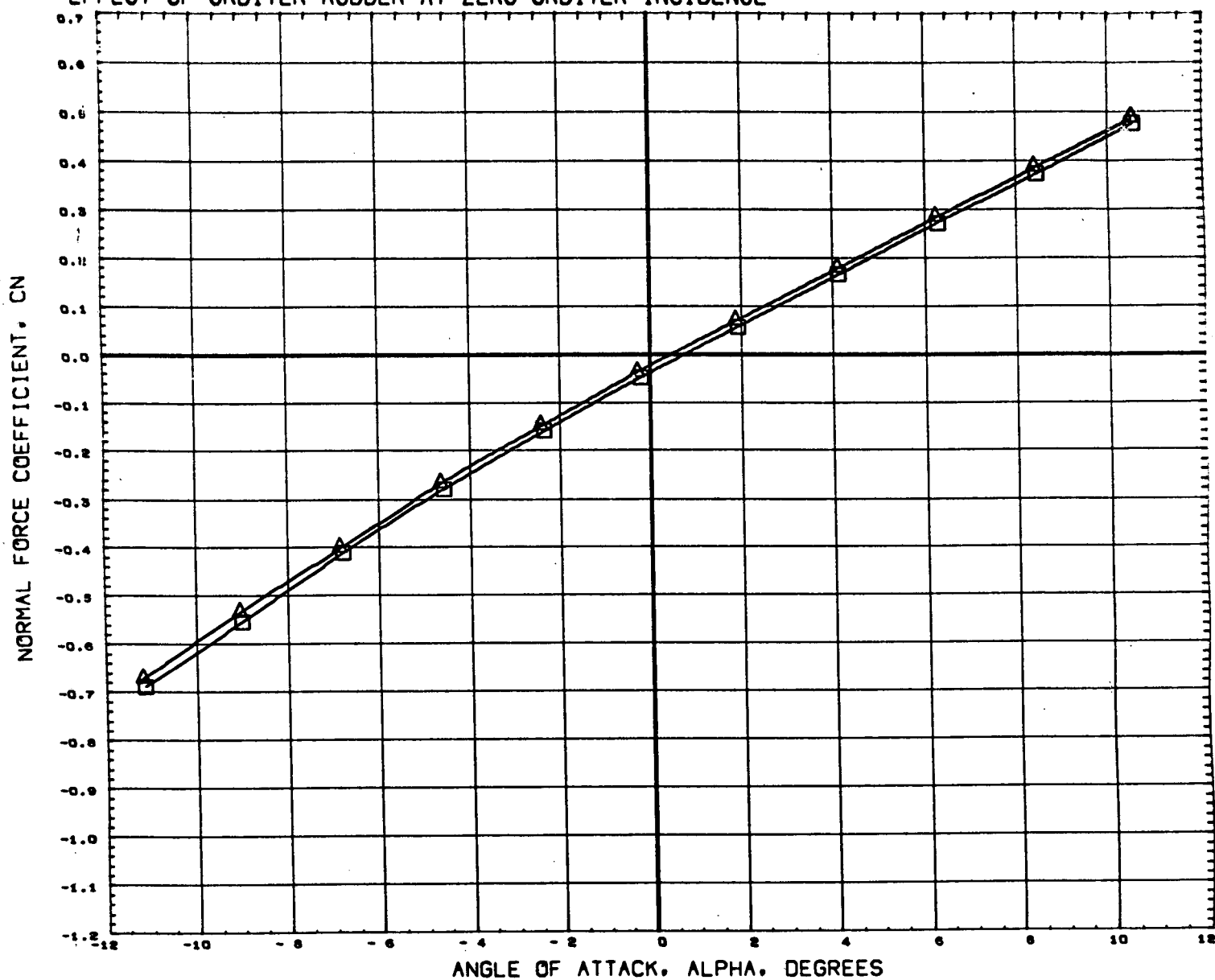
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30281 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30281 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



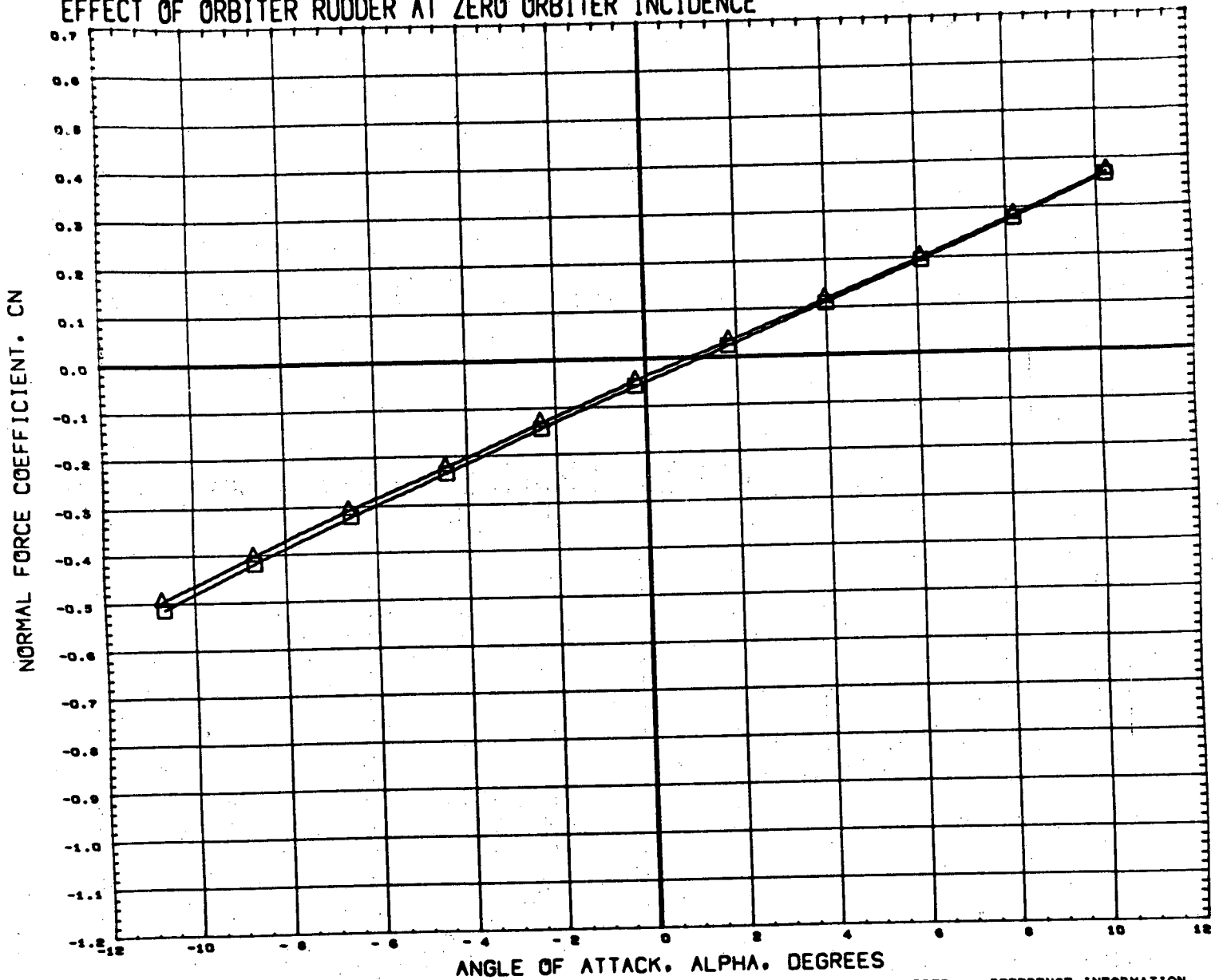
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.95

PAGE 436

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



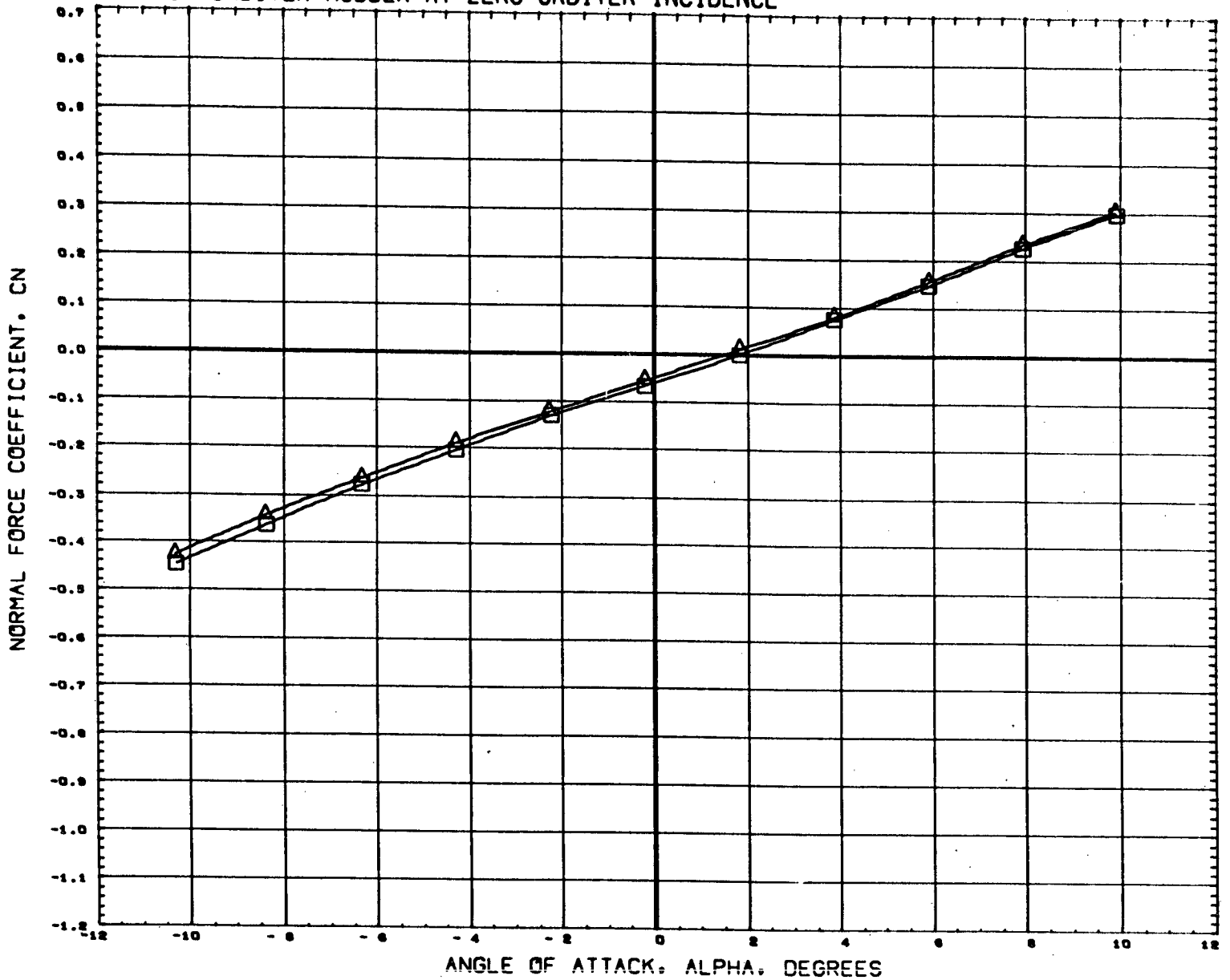
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|-----------------|---|
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| (B71091) | NSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (B71093) | NSFC TWT 344X LAUNCH VEHICLE STUDIES T302S1 |

| ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|---------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2460 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

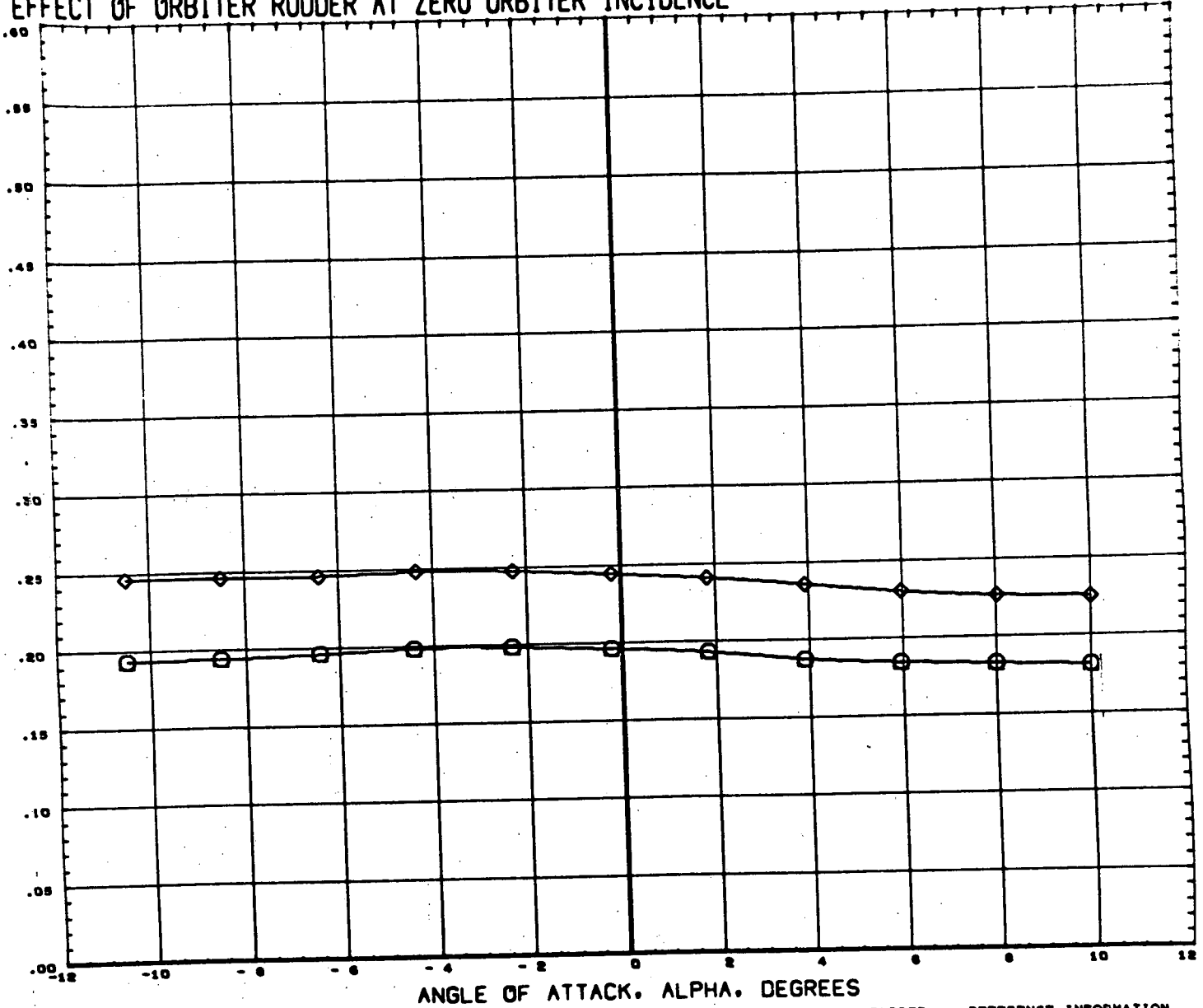


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SRFP | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LRFP | 2.0260 IN. |
| (871095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BRFP | 4.4800 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | YMFP | 3.3600 IN. |
| | | | | | | ZMFP | 0.0000 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

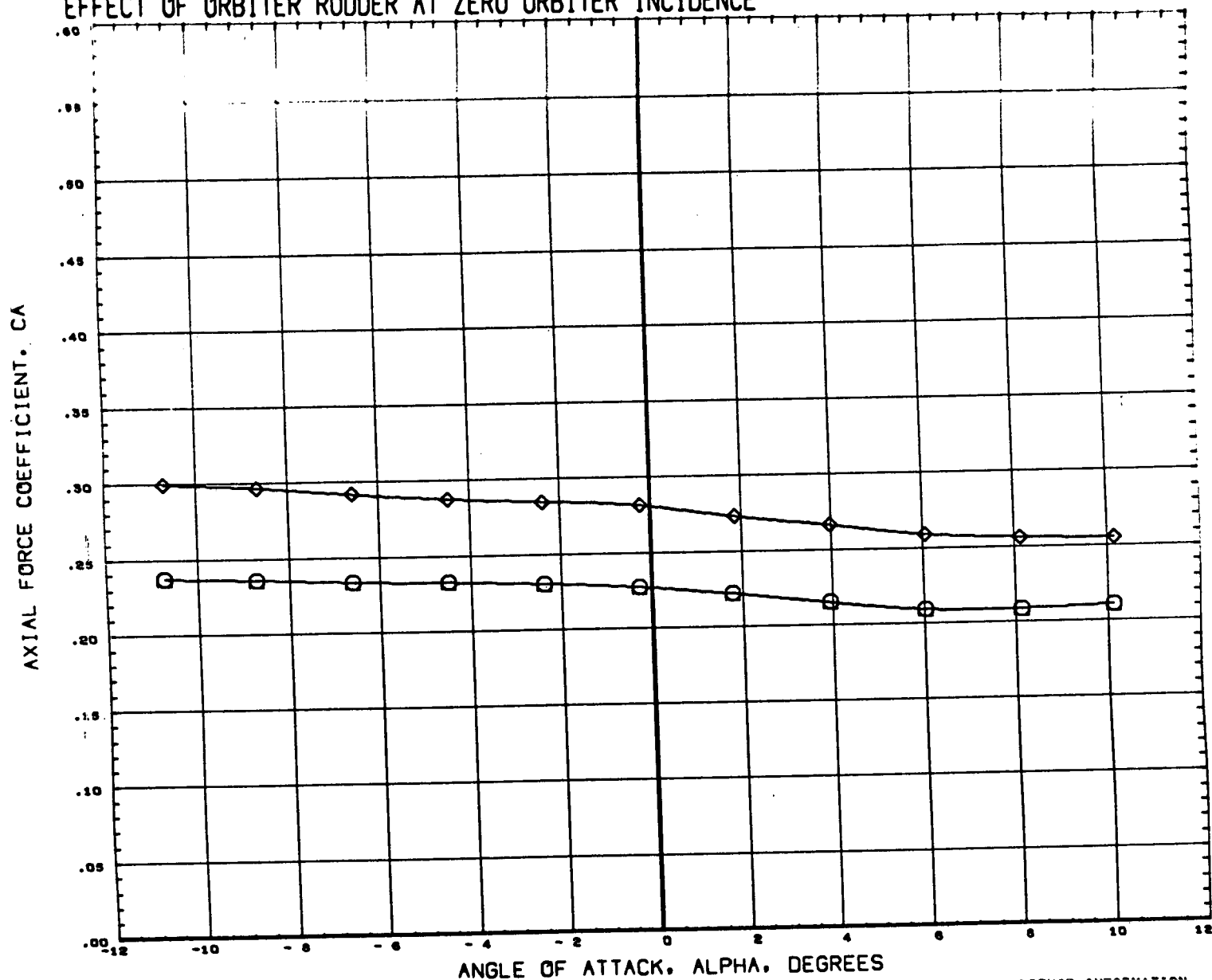
AXIAL FORCE COEFFICIENT, C_A



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | Y5 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| (B71097) | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | T301S1 |
|-----------------|---------------------------------------|--------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T301S1 |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |

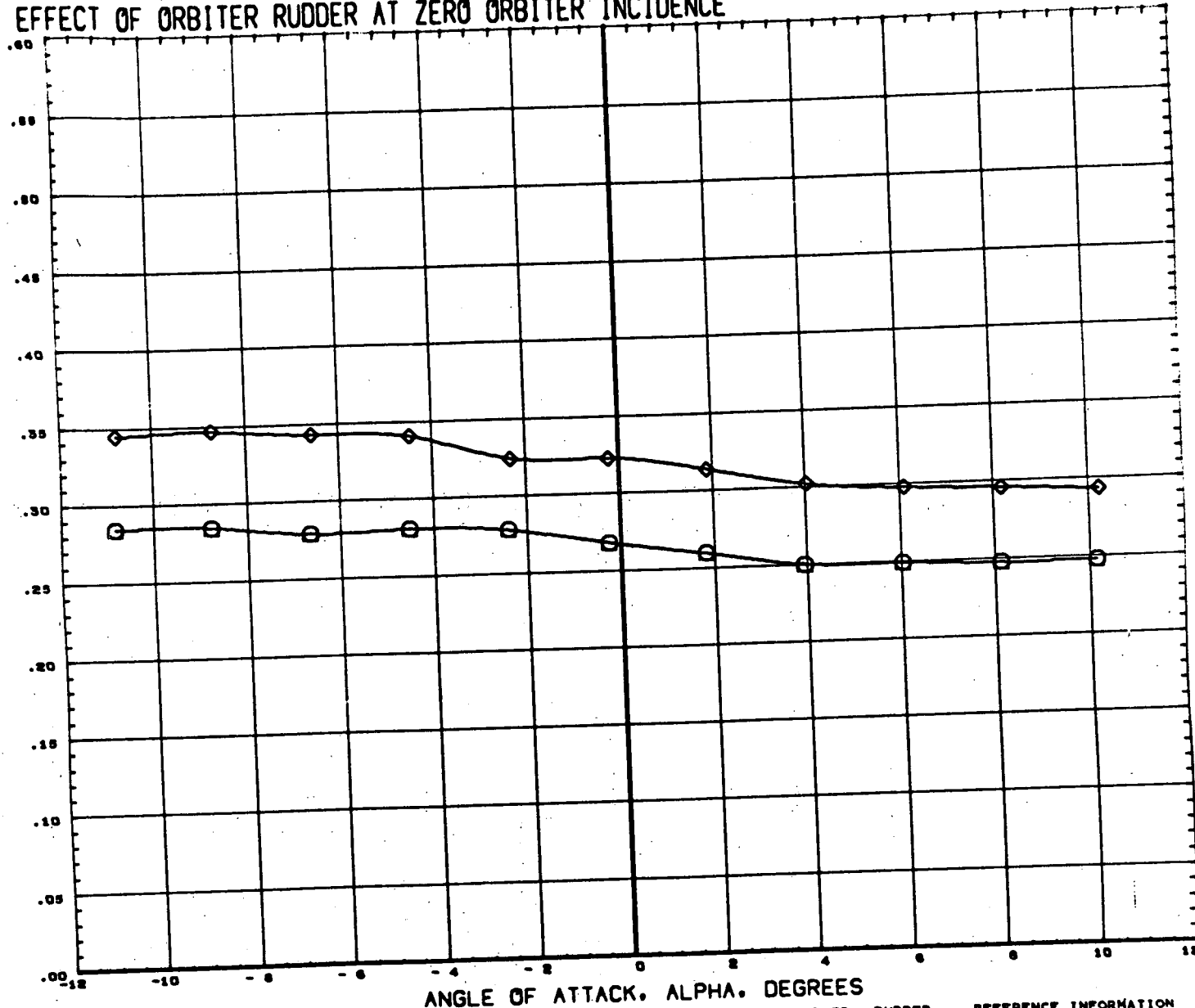
| ORBINC | YS | ELEVTR | RUDDER |
|--------|-------|--------|--------|
| 0.000 | 0.023 | 0.000 | 0.000 |
| 0.000 | 0.023 | 0.000 | 0.000 |
| 0.000 | 0.023 | 0.000 | 30.000 |
| 0.000 | 0.023 | 0.000 | 30.000 |

| REFERENCE INFORMATION | | |
|-----------------------|--------|--------|
| SREF | 7.8800 | 39.1N. |
| LREF | 2.0260 | 1N. |
| BREF | 4.4600 | 1N. |
| XMRP | 3.3600 | 1N. |
| YMRP | 0.0000 | 1N. |
| ZMRP | 0.2480 | 1N. |
| SCALE | 0.0040 | SCALE |

MACH .80

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

AXIAL FORCE COEFFICIENT, CA



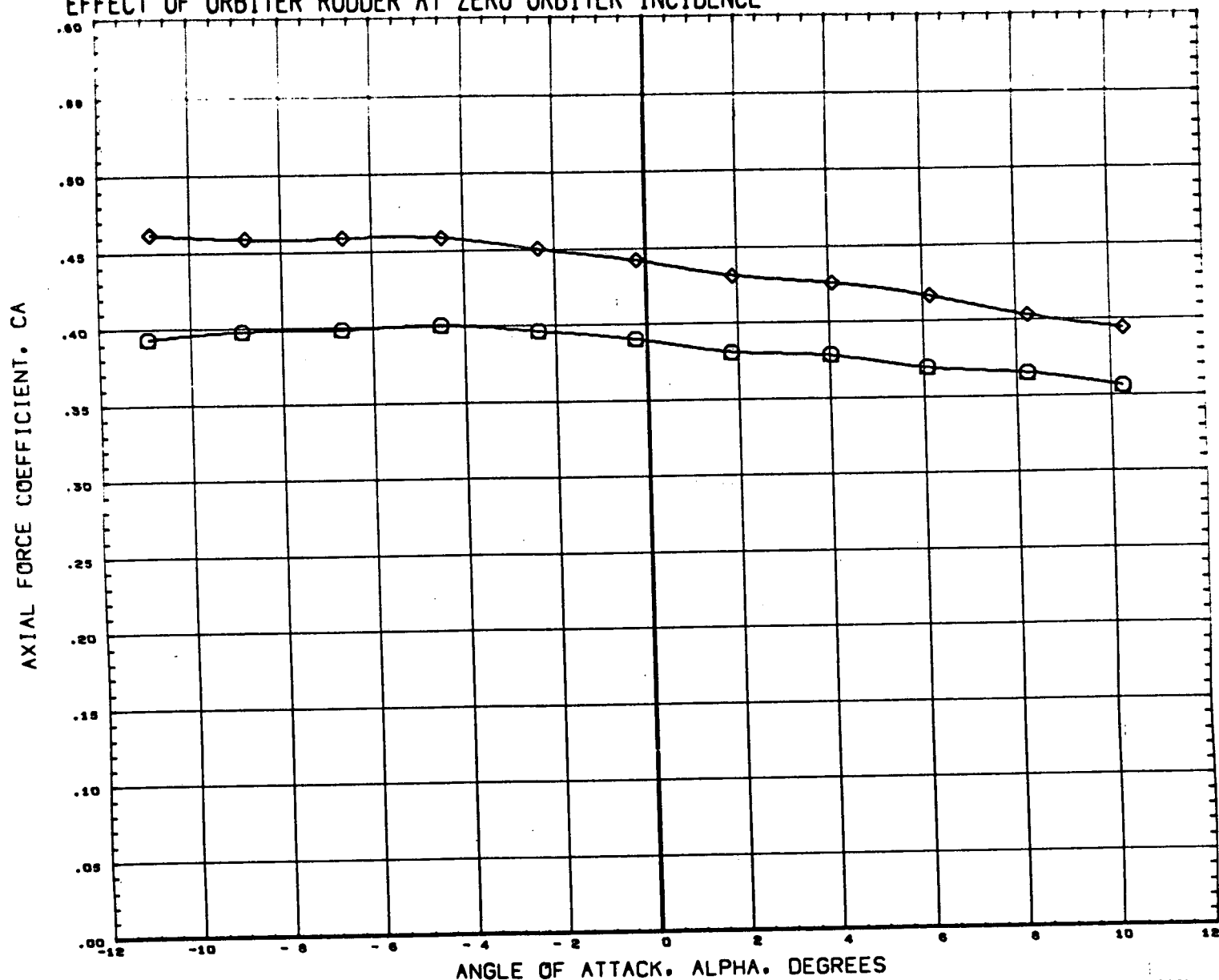
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 (B71091) DATA NOT AVAILABLE FOR ALL CONDITIONS
 (B71093) MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181
 (B71095) DATA NOT AVAILABLE FOR ALL CONDITIONS

| ORBITER | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|---------|-------|--------|--------|-----------------------|--------|---------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | YMRP | 0.0000 | IN. |
| | | | | ZMRP | 0.8480 | IN. |
| | | | | SCALE | 0.0040 | SCALE |

MACH

.90

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(871089) MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1

(871091) DATA NOT AVAILABLE FOR ALL CONDITIONS

(871095) MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1

(871093) DATA NOT AVAILABLE FOR ALL CONDITIONS

| ORBINC | YS | ELEVTR | RUDDER |
|--------|-------|--------|--------|
| 0.000 | 0.023 | 0.000 | 0.000 |
| 0.000 | 0.023 | 0.000 | 0.000 |
| 0.000 | 0.023 | 0.000 | 30.000 |
| 0.000 | 0.023 | 0.000 | 30.000 |

REFERENCE INFORMATION

| | | |
|-------|--------|---------|
| SREF | 7.8600 | SQ. IN. |
| LREF | 2.0240 | IN. |
| BREF | 4.4600 | IN. |
| XMPP | 3.3600 | IN. |
| YMPP | 0.0000 | IN. |
| ZMPP | 0.2460 | IN. |
| SCALE | 0.0040 | SCALE |

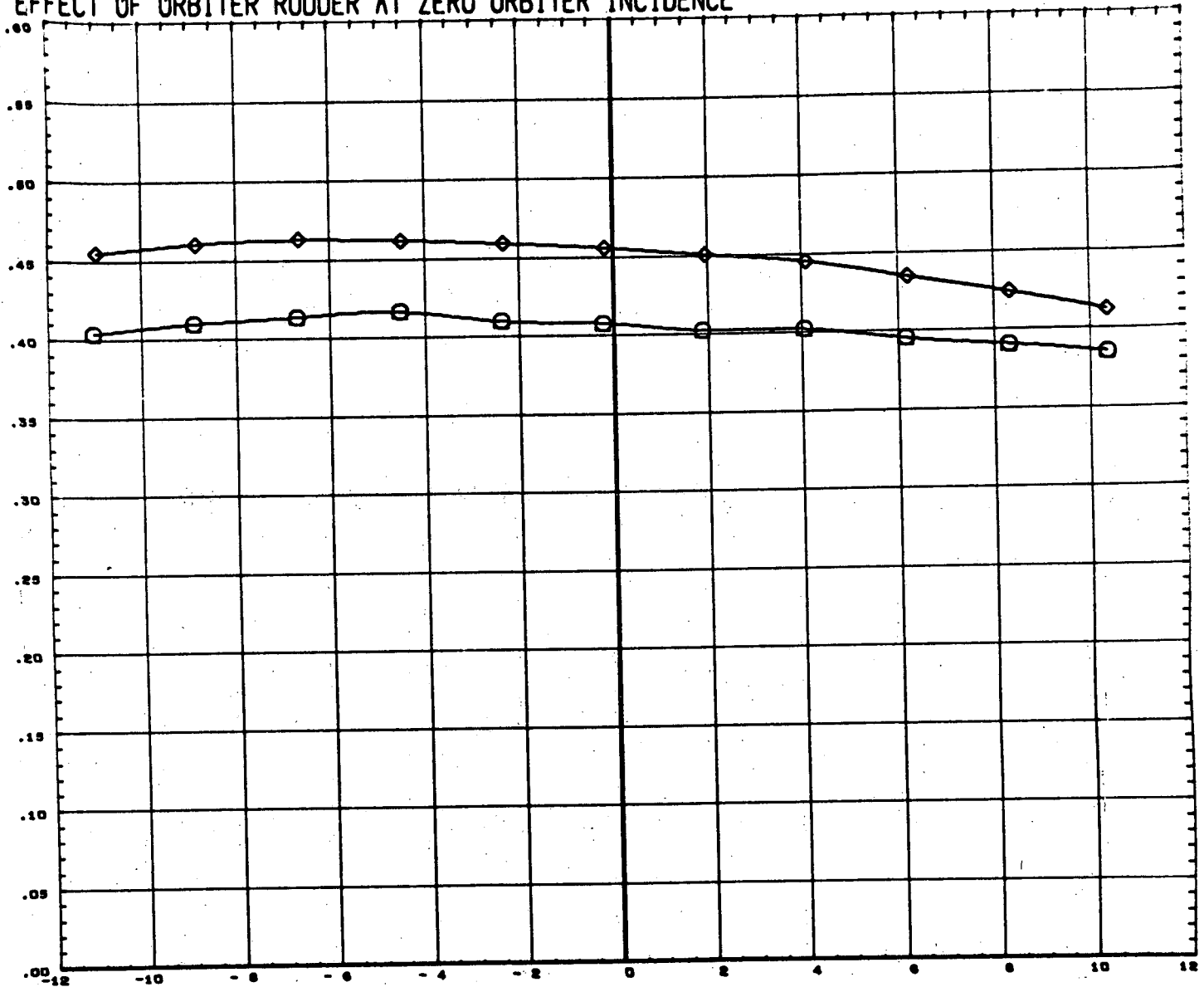
MACH

1.00

PAGE 442

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

AXIAL FORCE COEFFICIENT, CA



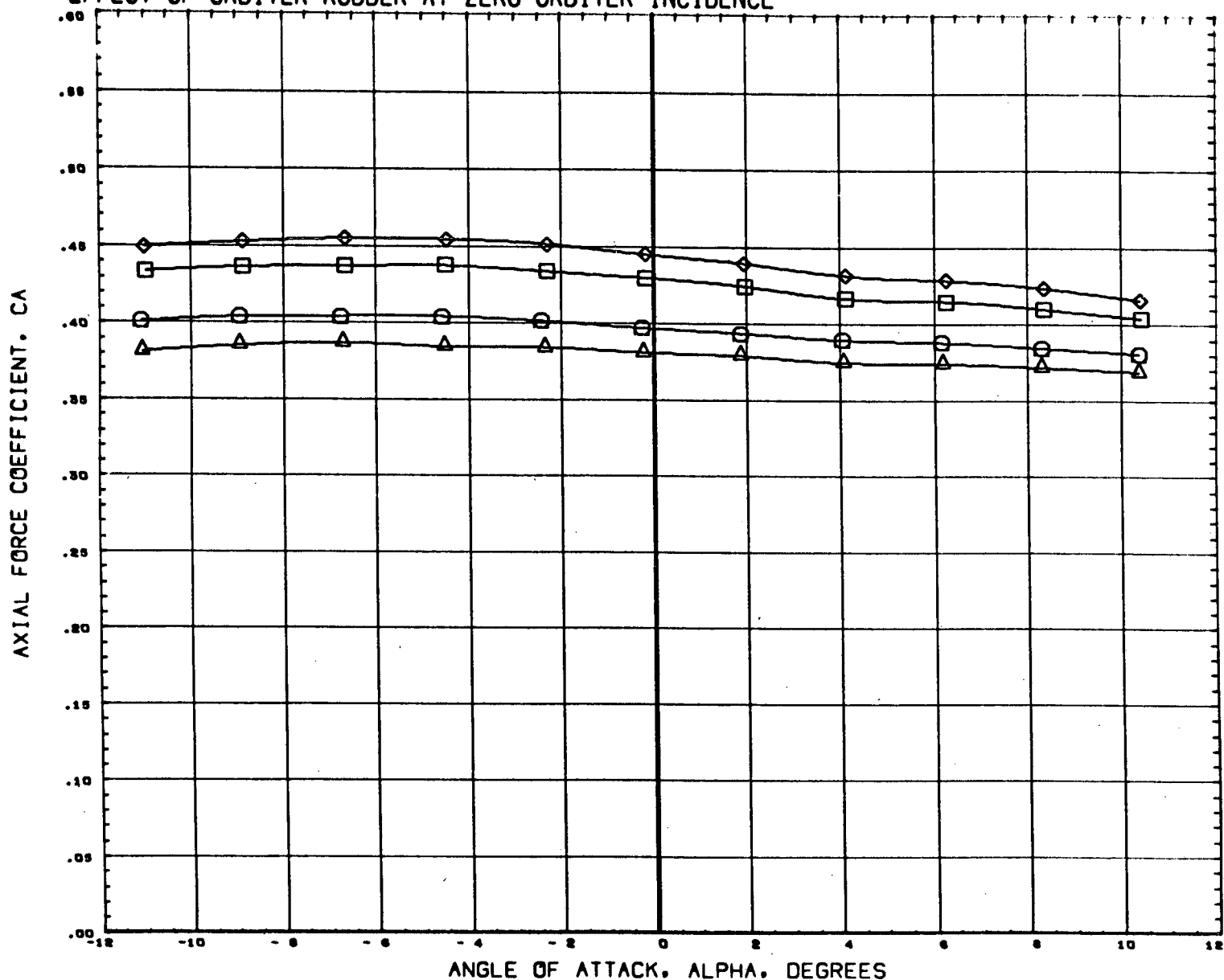
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | MSFC TWT S44X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.10

PAGE 443

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

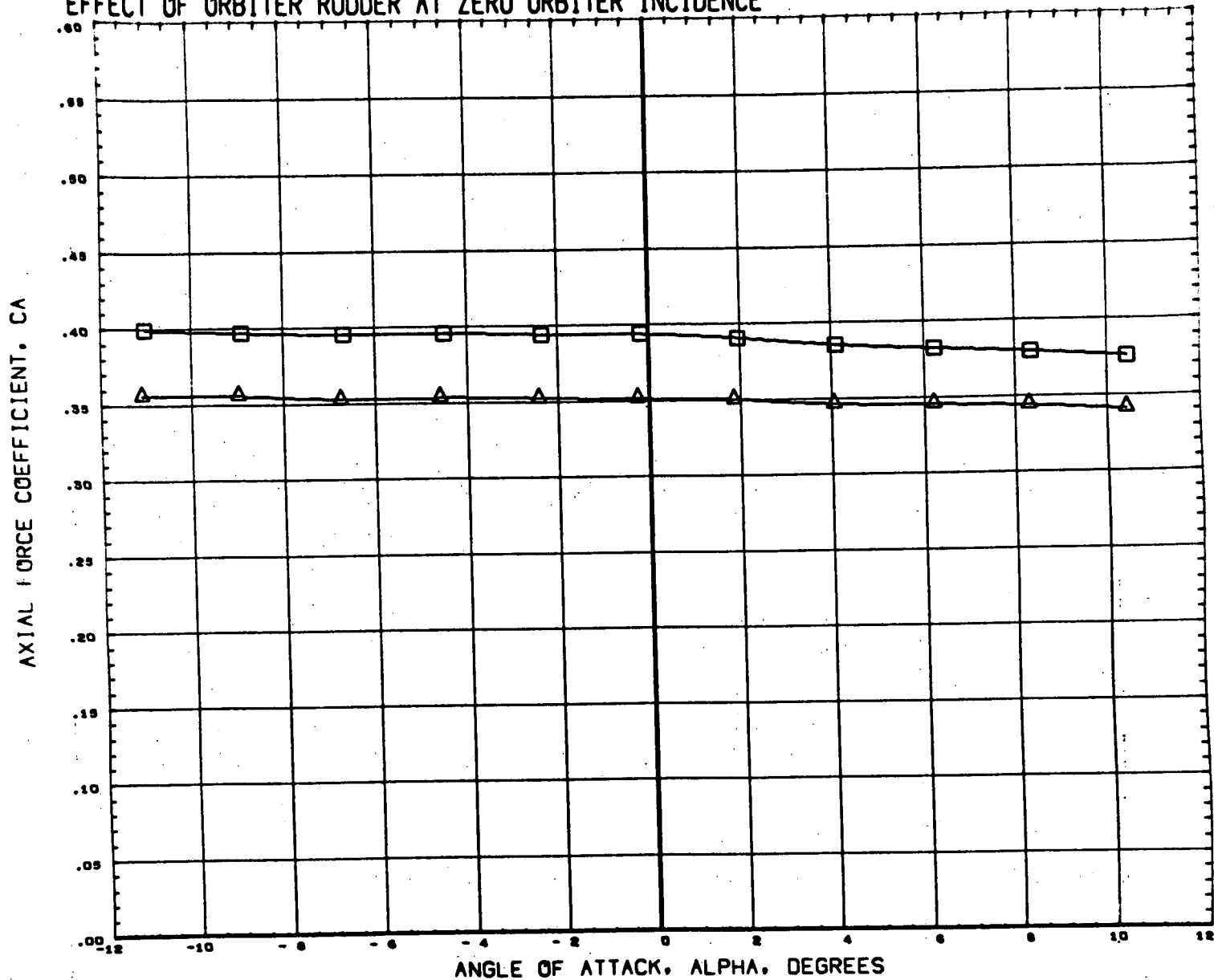


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

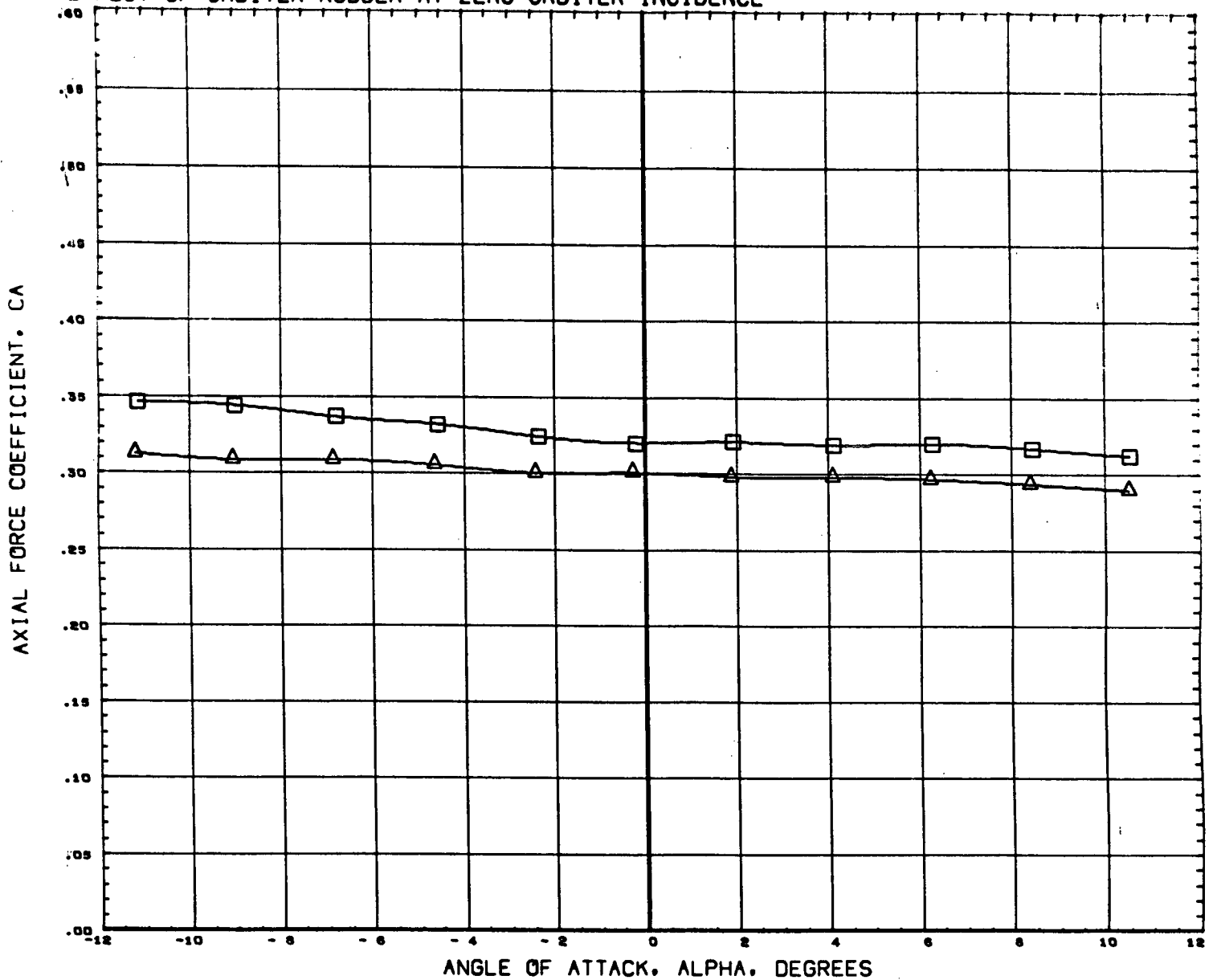


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30281 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 30.000 | XNRP | 3.3600 IN. |
| | | | | | | YNRP | 0.0000 IN. |
| | | | | | | ZNRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

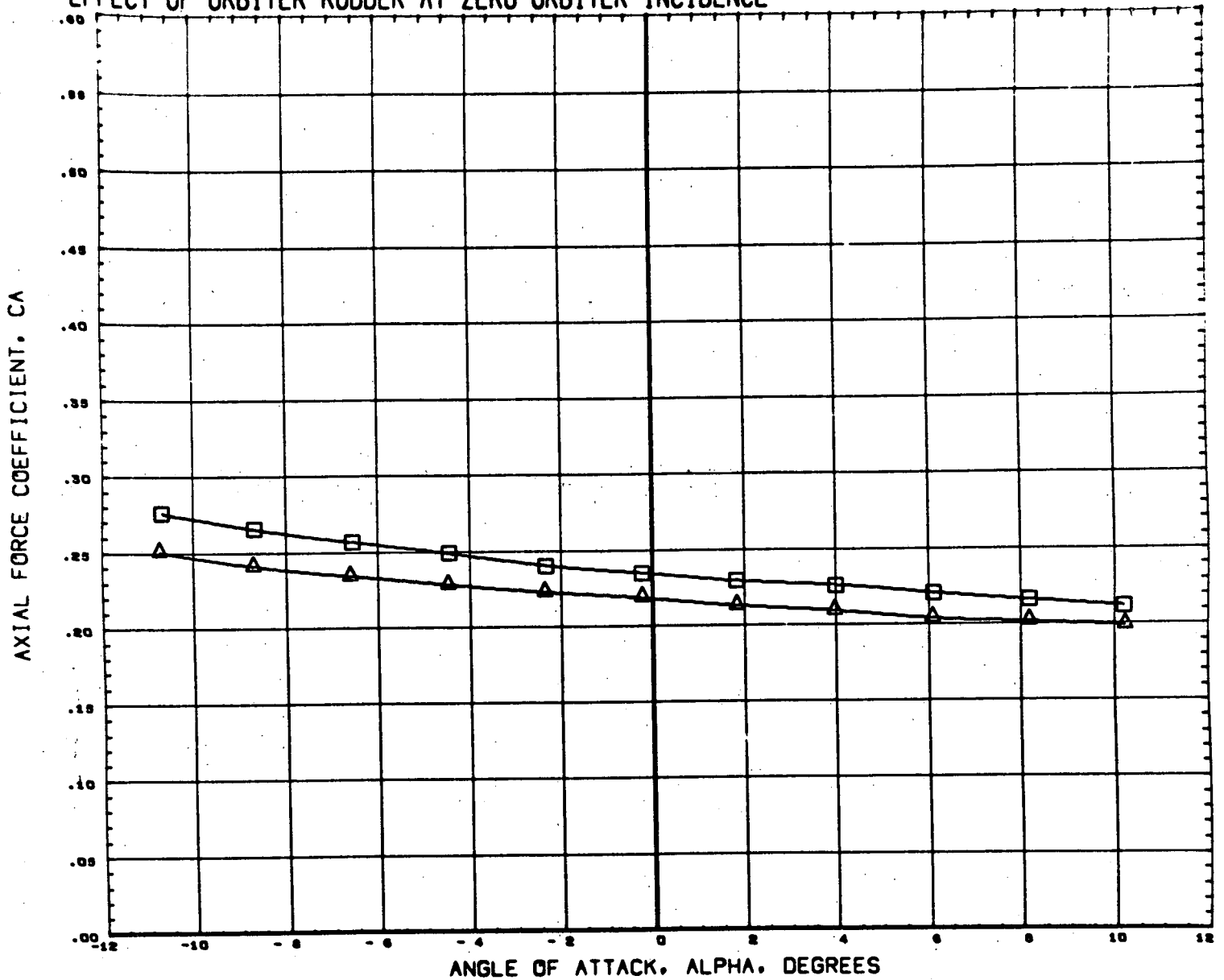


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

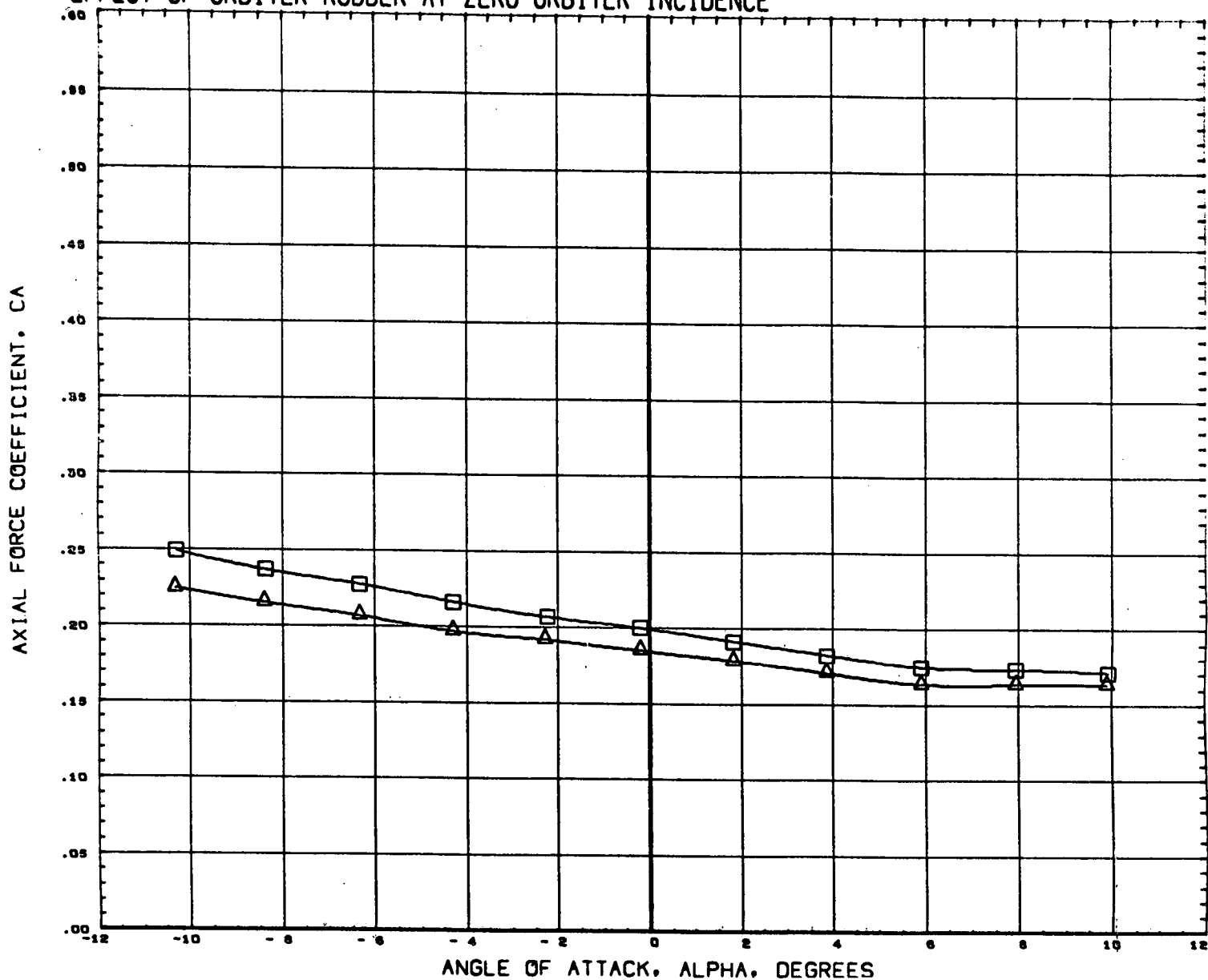


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YB | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

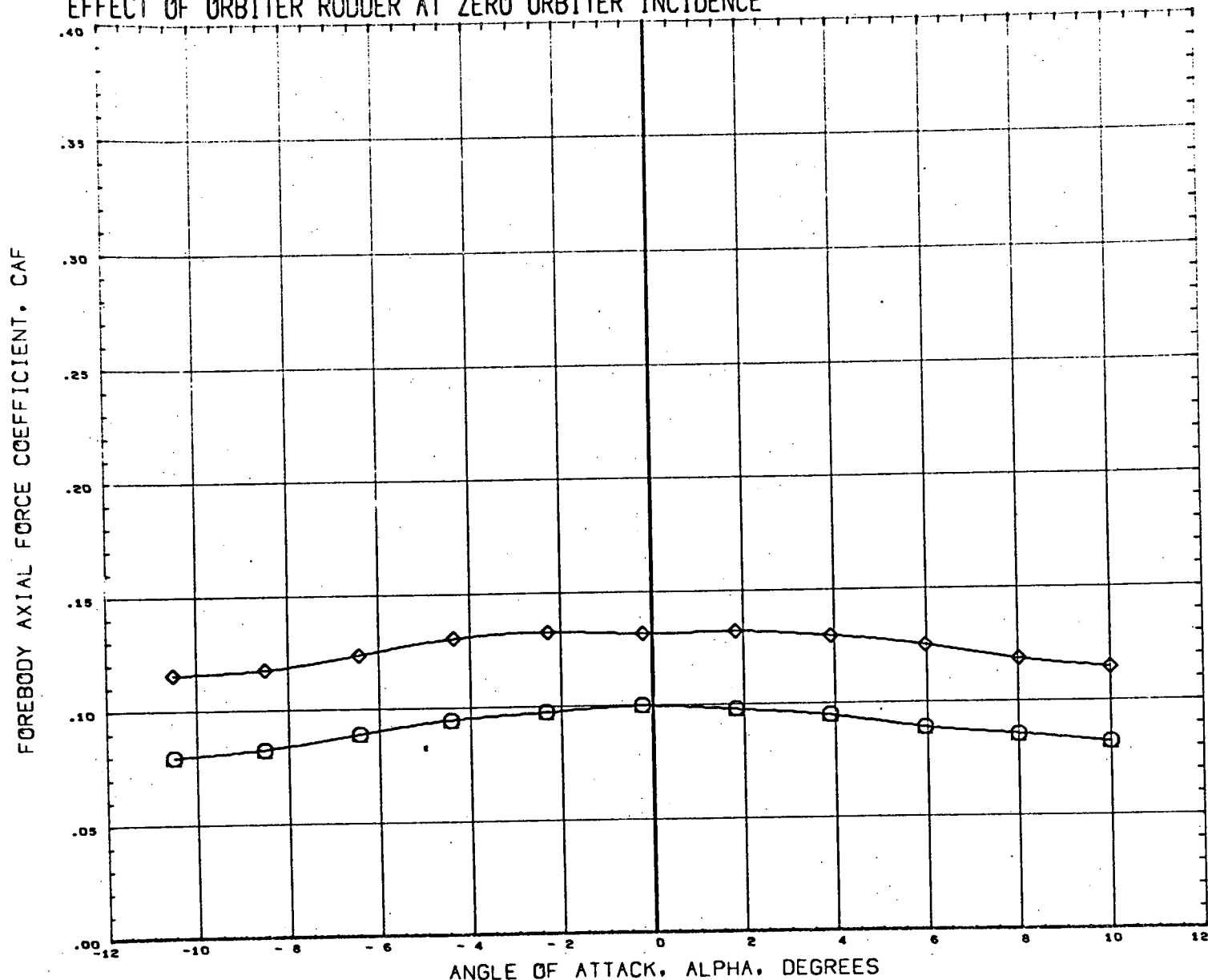


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 4.96

PAGE 448

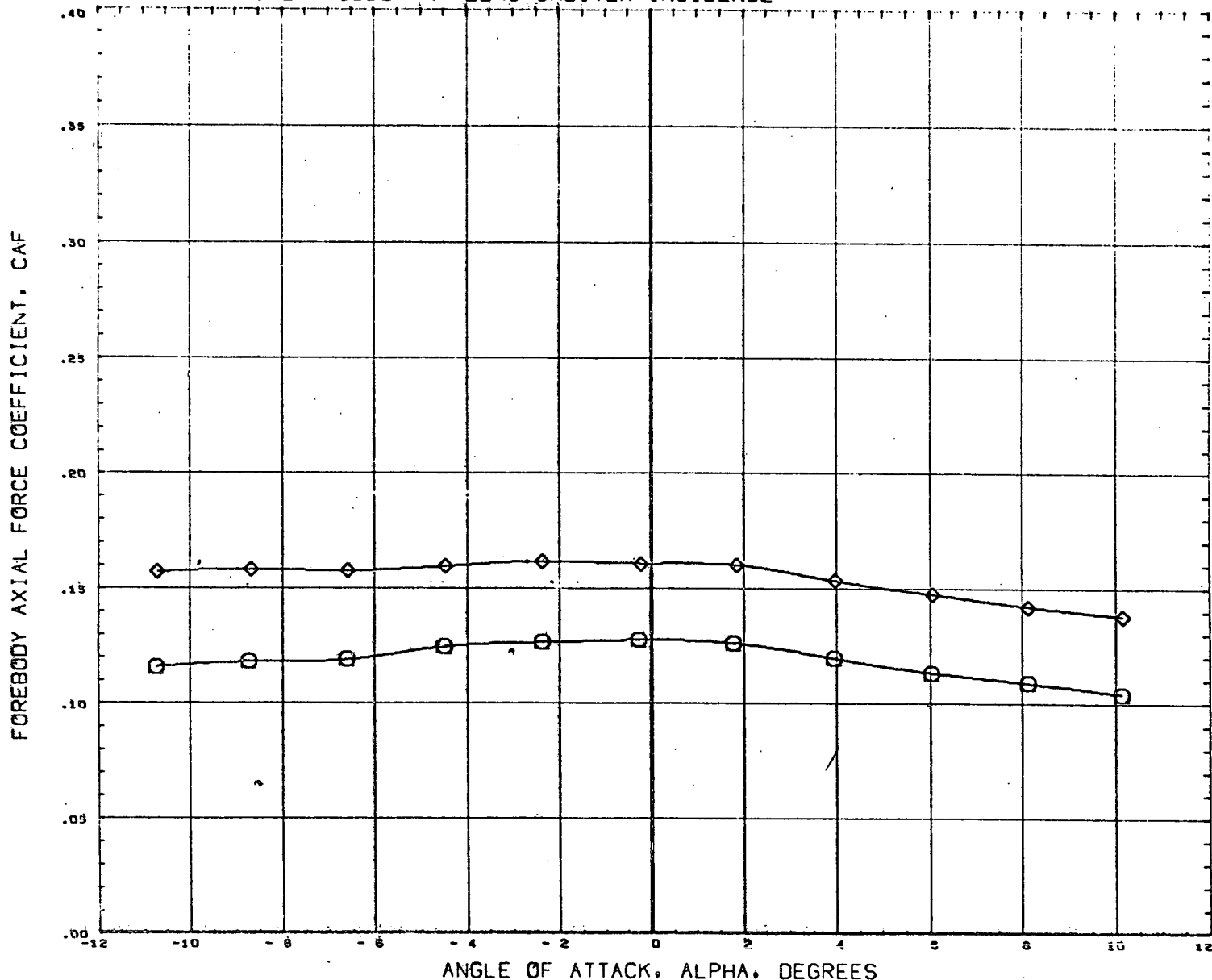
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.9800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

PAGE 450

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



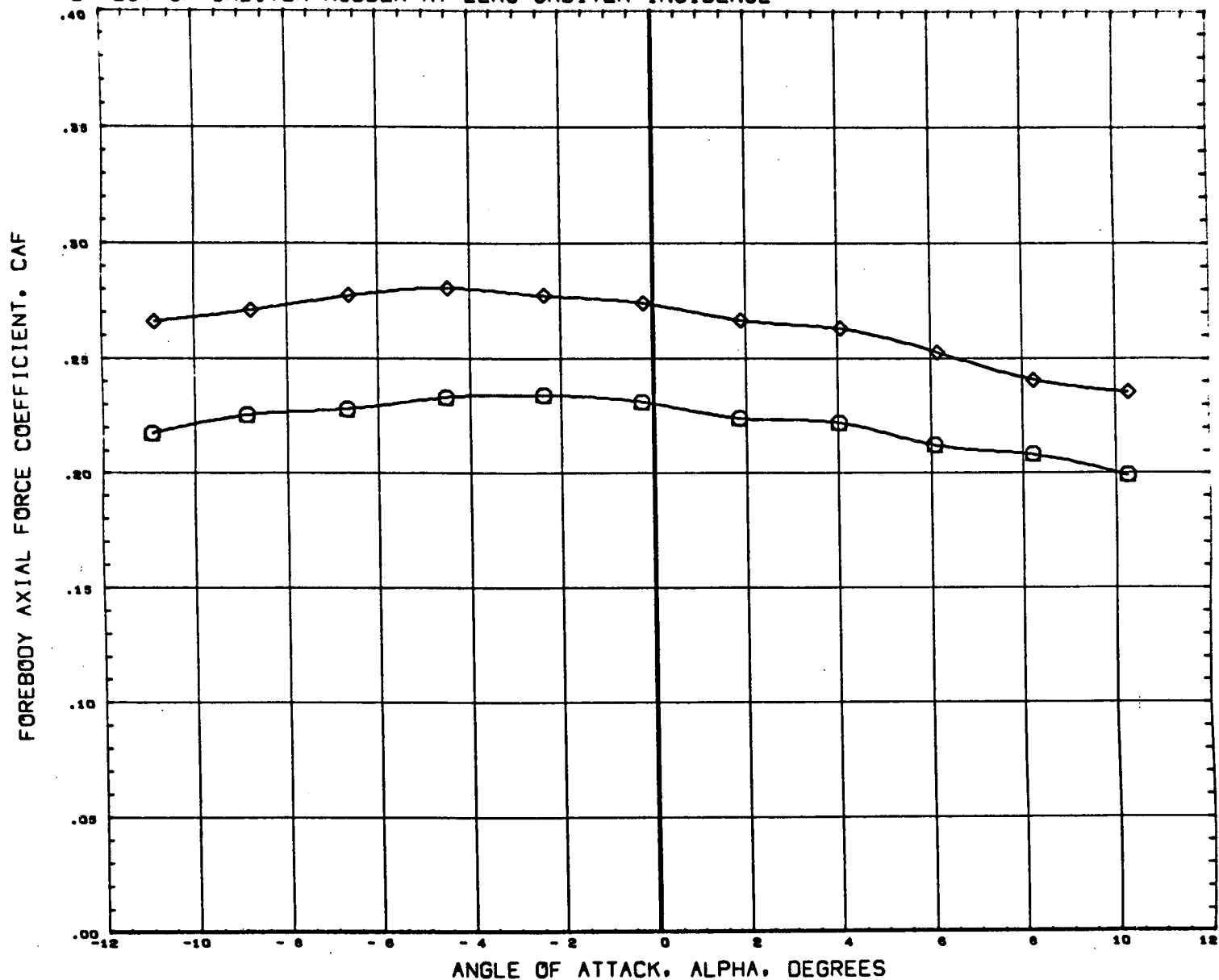
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YB | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|---------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30151 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 34.1N. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 1N. |
| (871095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30151 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 1N. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 1N. |
| | | | | | | YMRP | 0.0000 1N. |
| | | | | | | ZMRP | 0.2480 1N. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



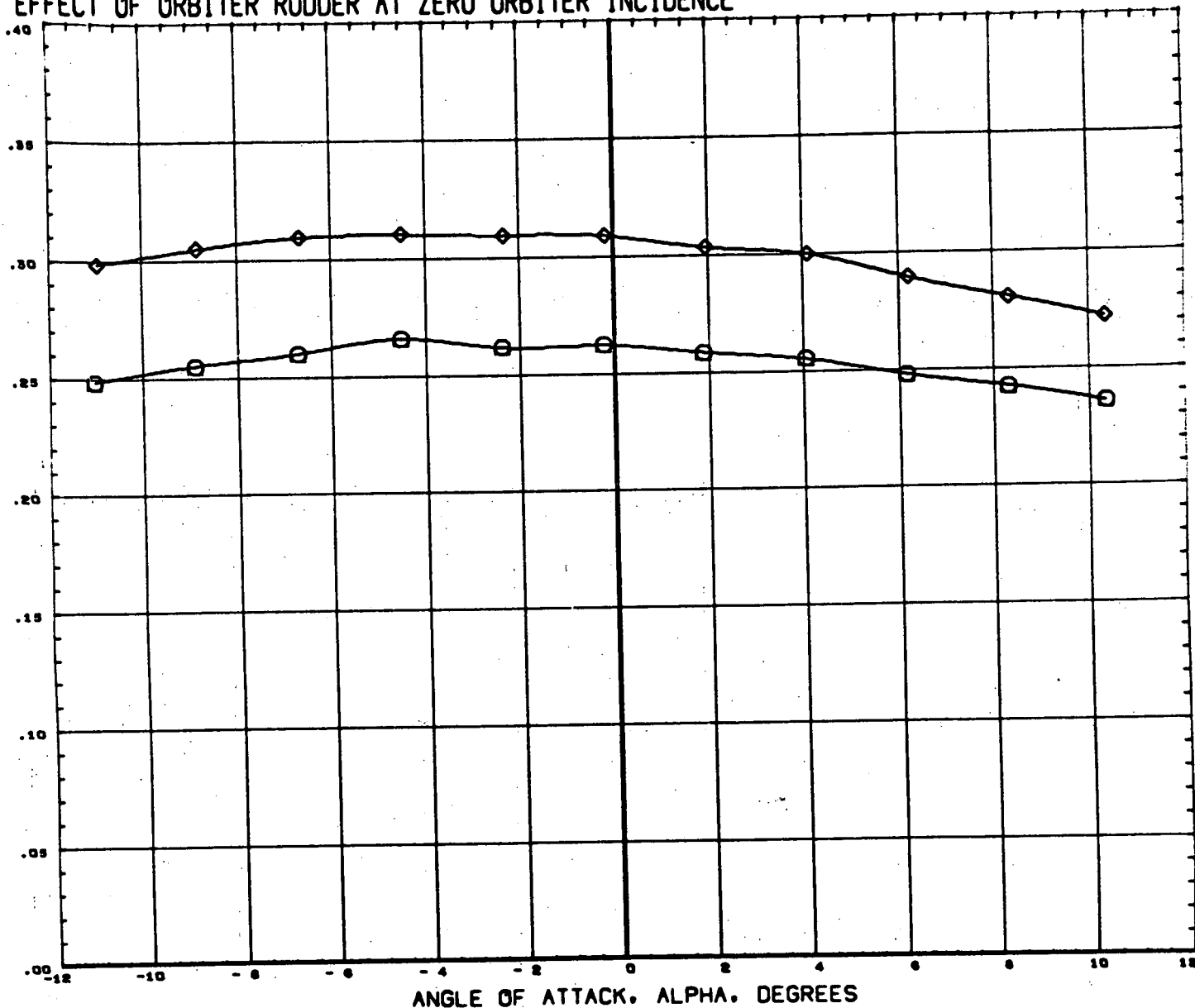
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

FOREBODY AXIAL FORCE COEFFICIENT, CAF

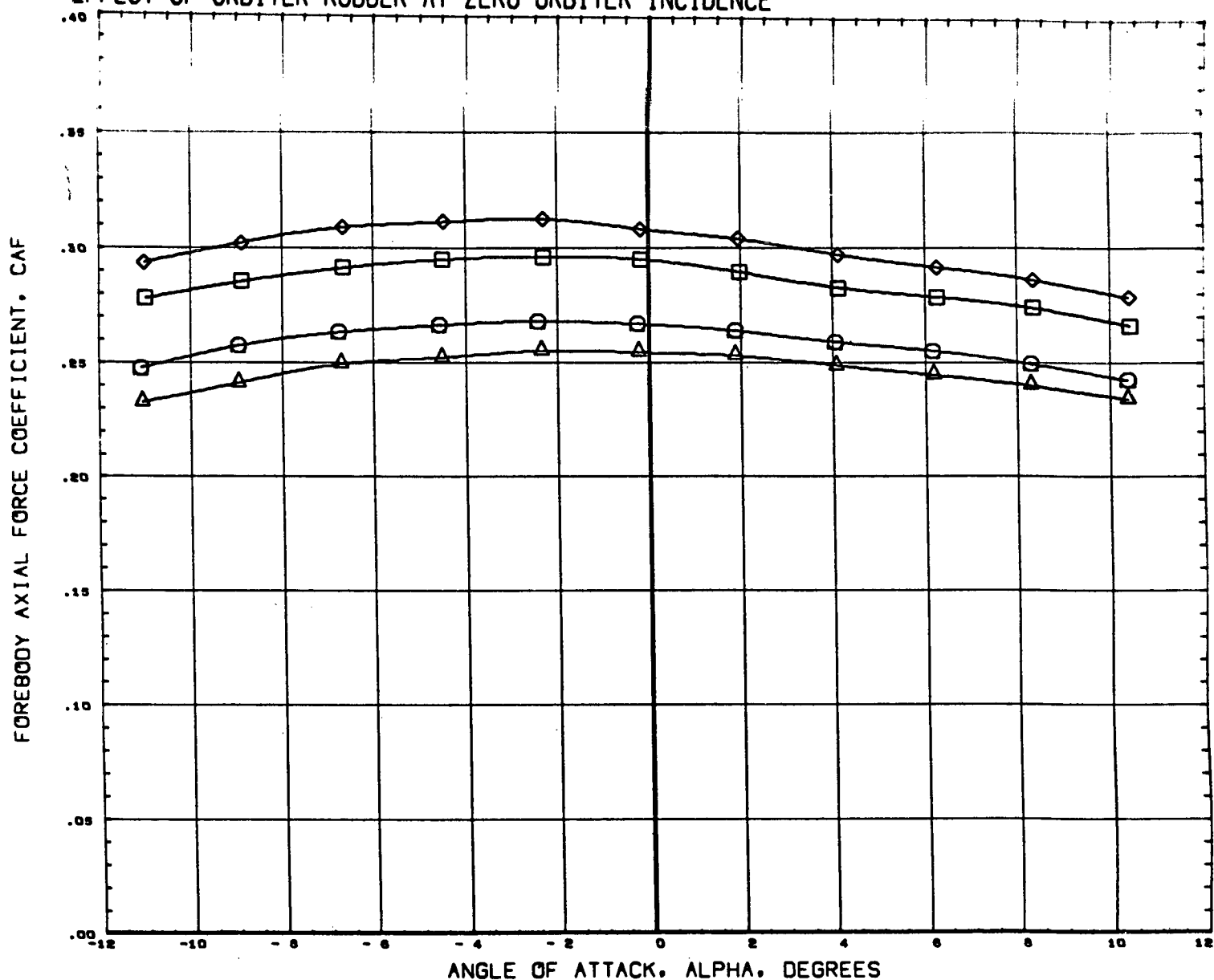


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| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 39. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30181 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.10

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

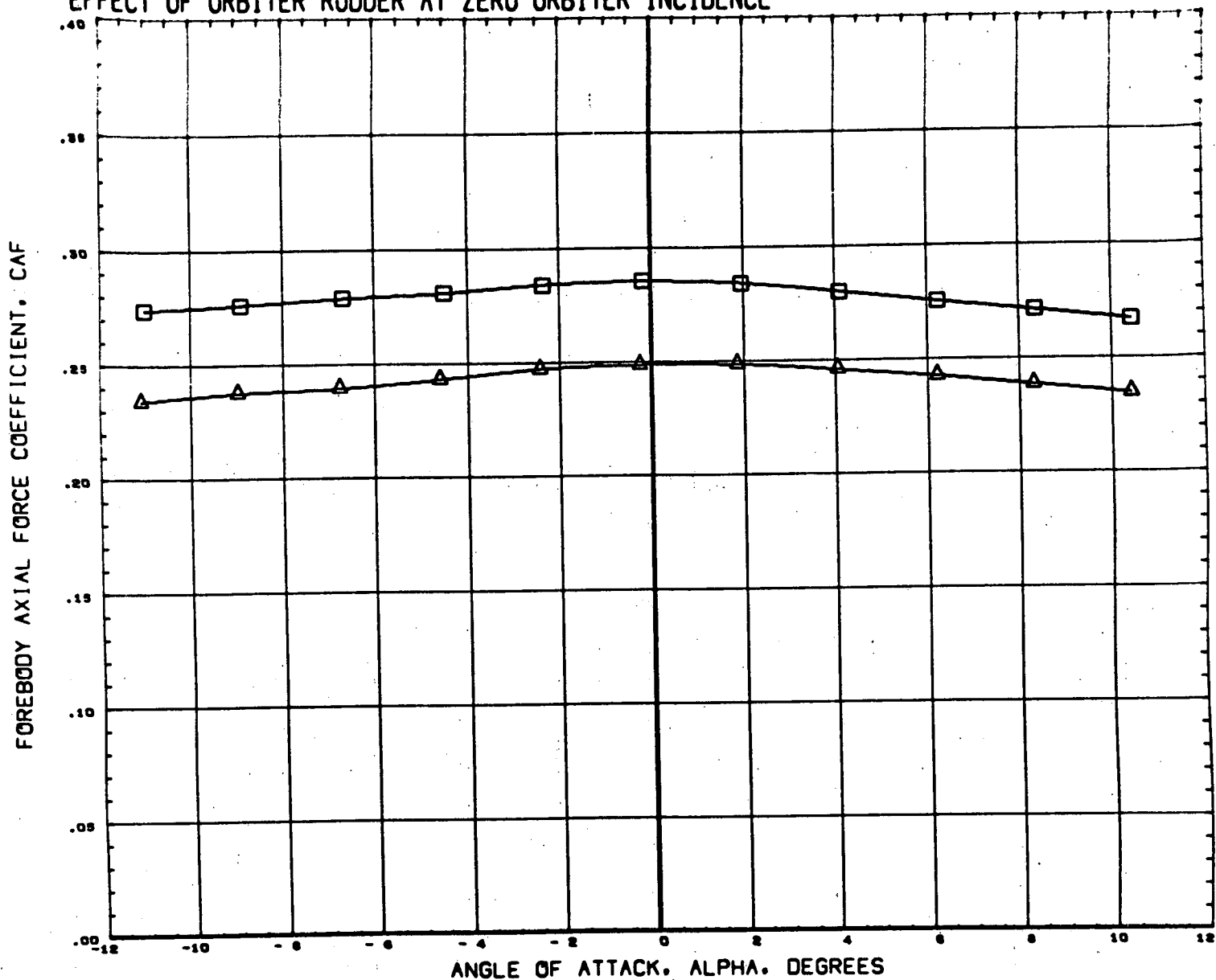


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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



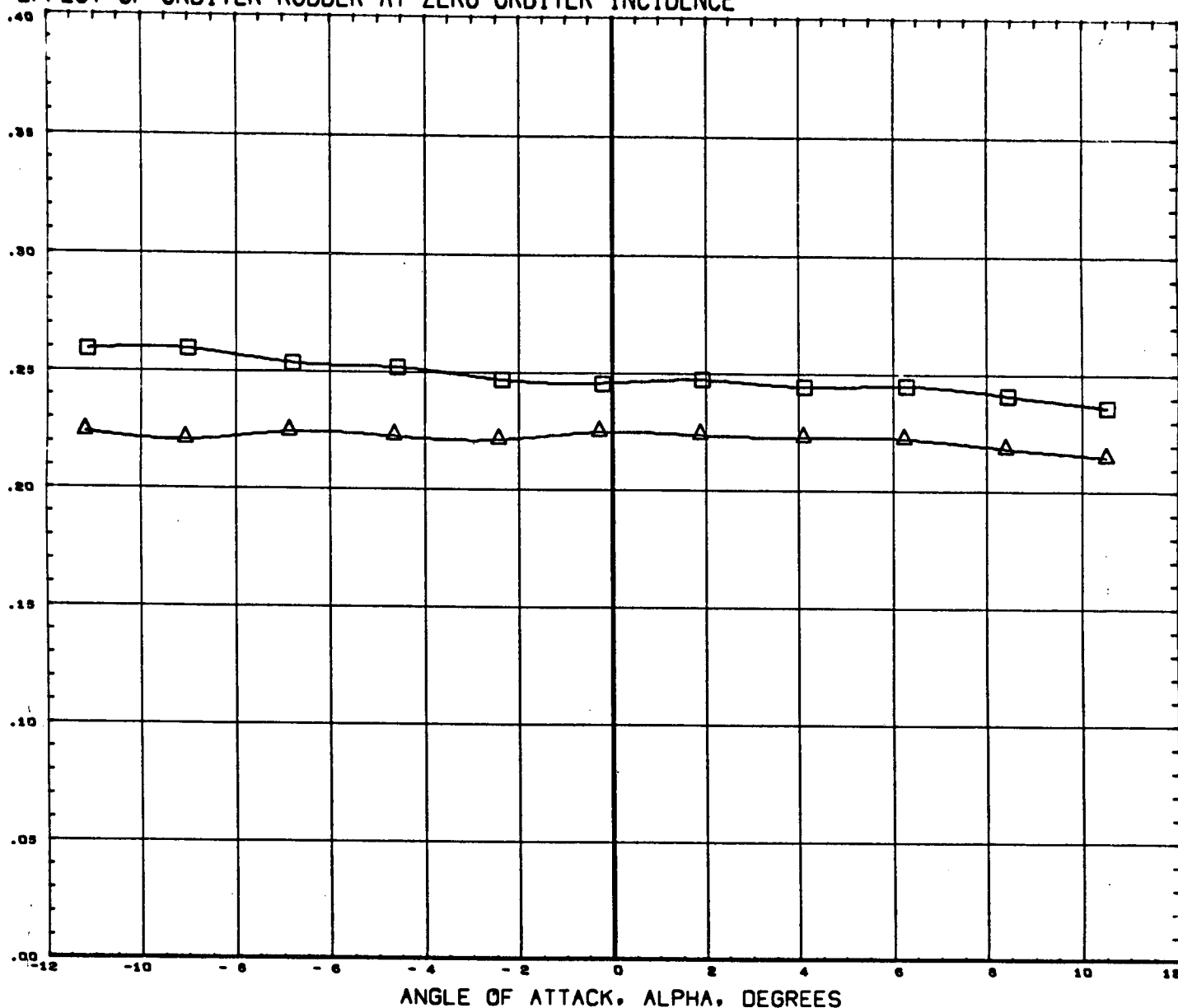
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|-----------------|---|--------|-------|--------|--------|-----------------------|-----------------|
| (871099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800' SQ. IN. |
| (871091) | MSFC TWT S44X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (871093) | MSFC TWT S44X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

FOREBODY AXIAL FORCE COEFFICIENT, CAF

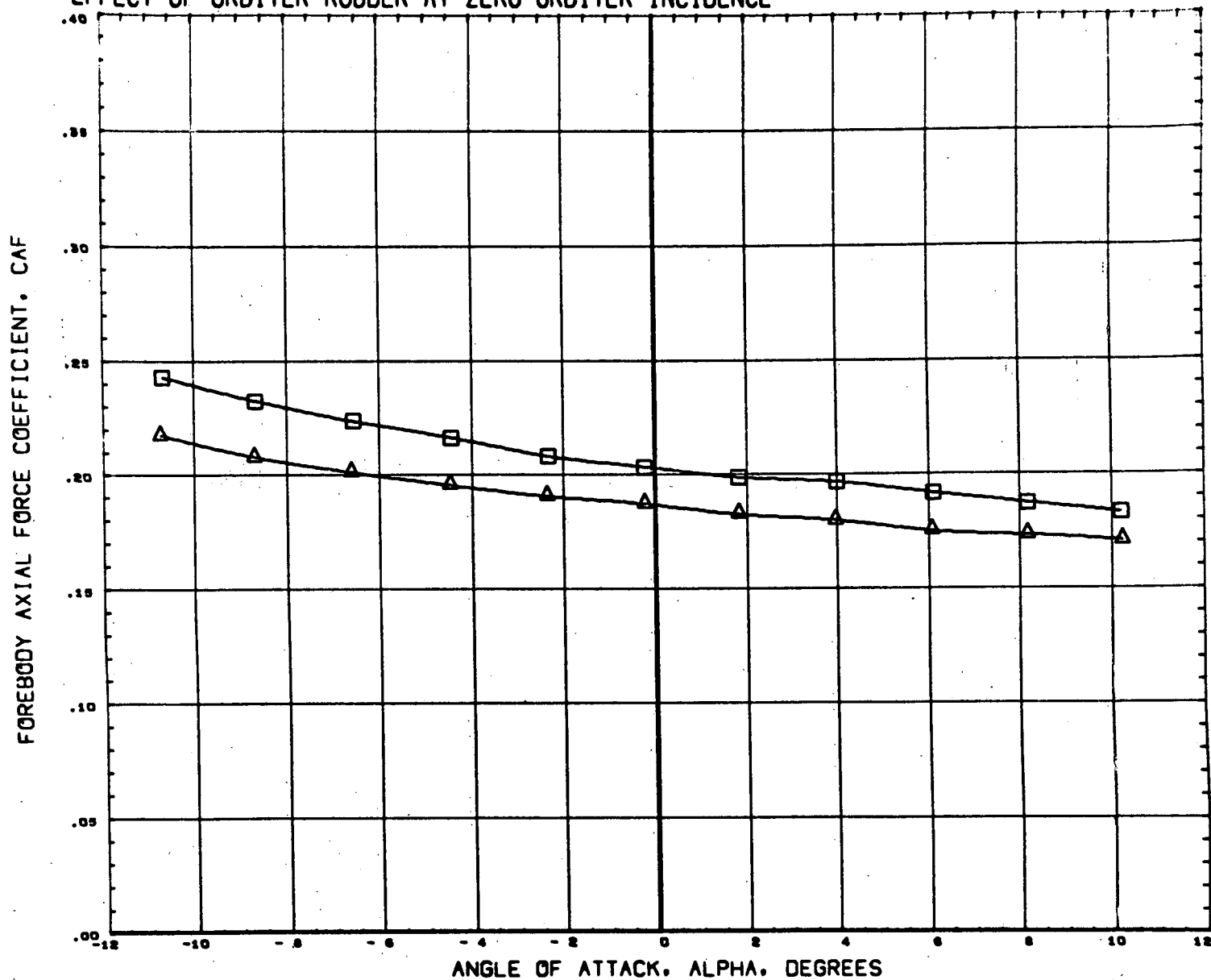


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
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| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

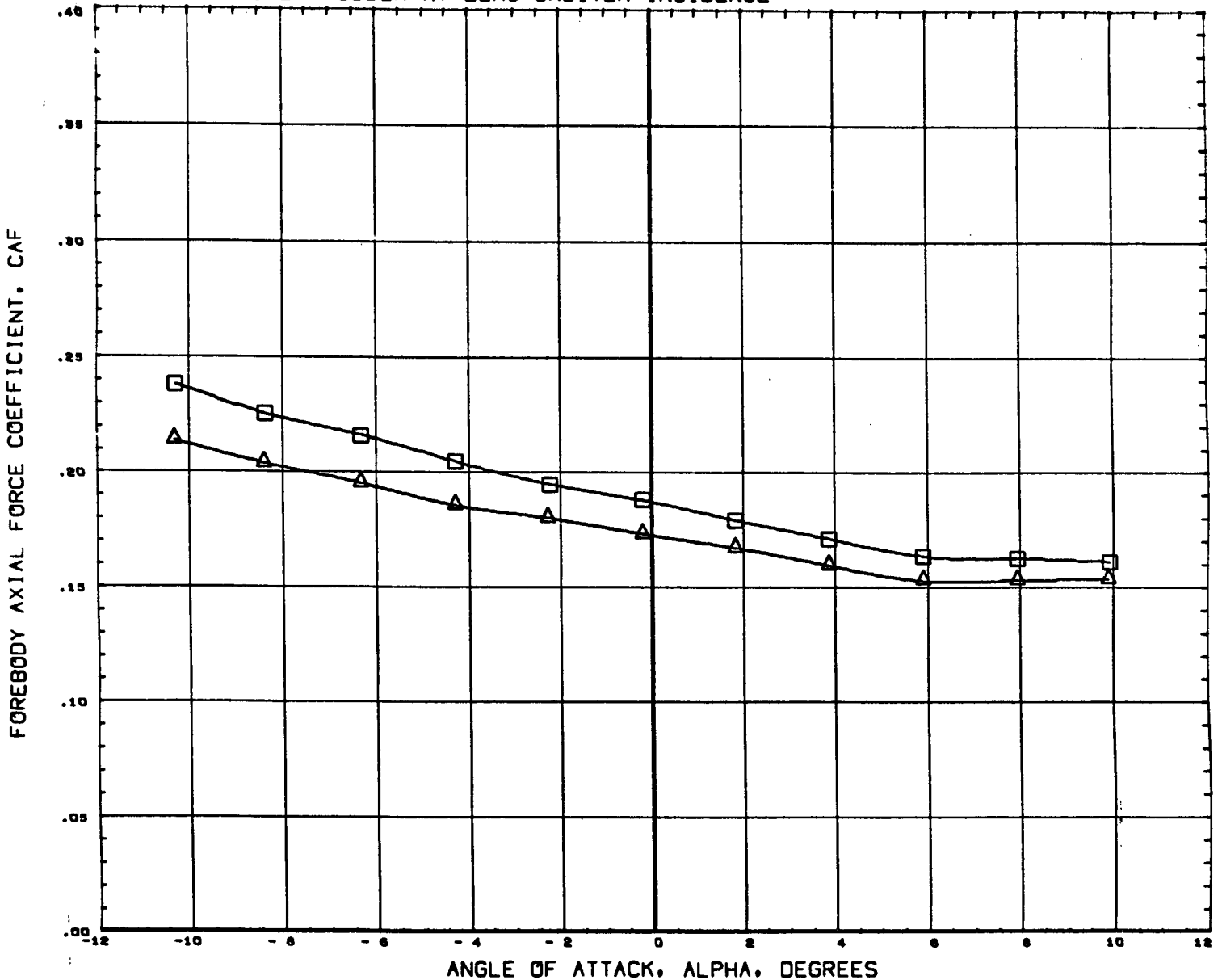


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT INC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-----------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T3C231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T3C231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

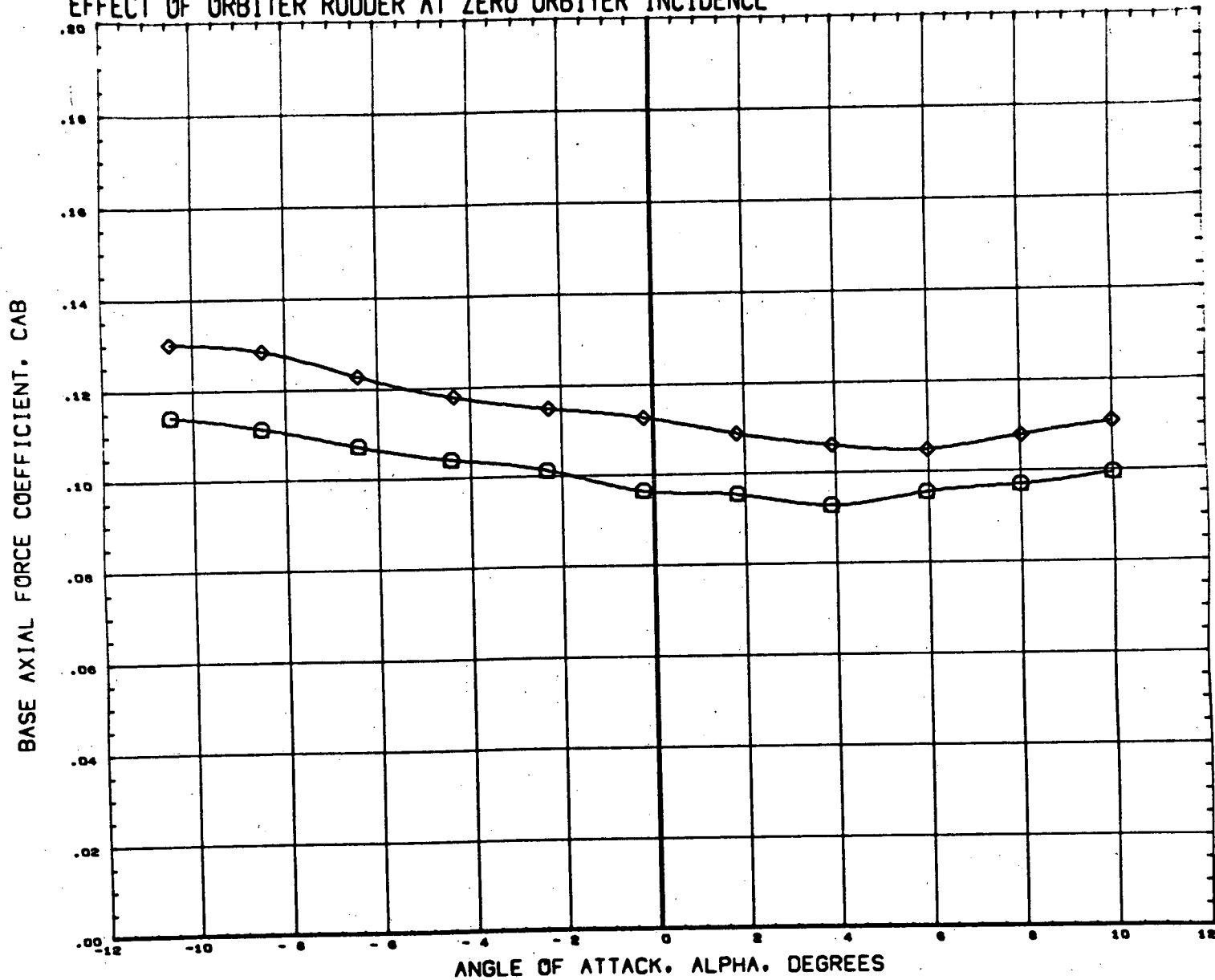


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



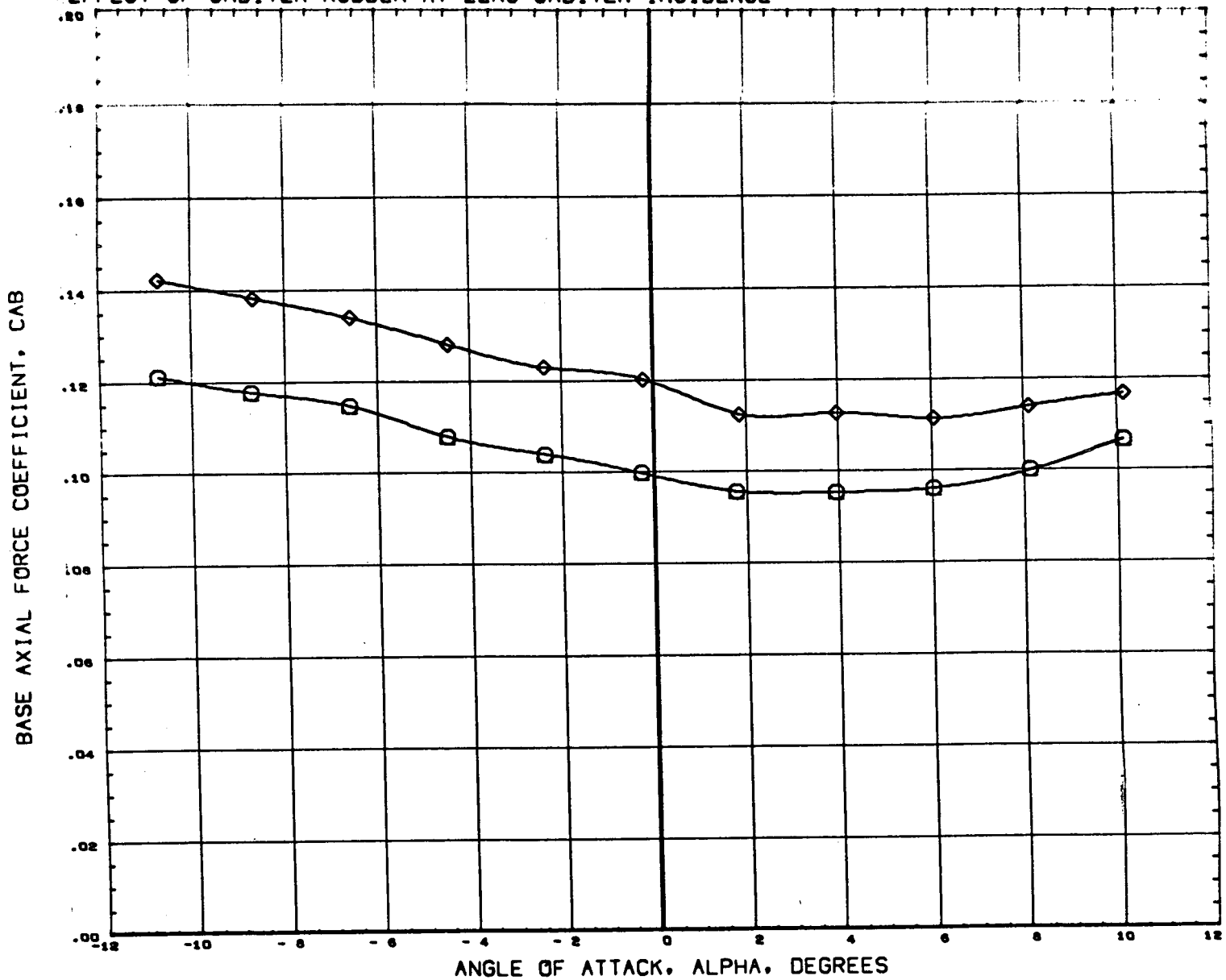
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|-----------------|---------------------------------------|--------|
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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | T30151 |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |

| ORBITER | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|---------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH

.60

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

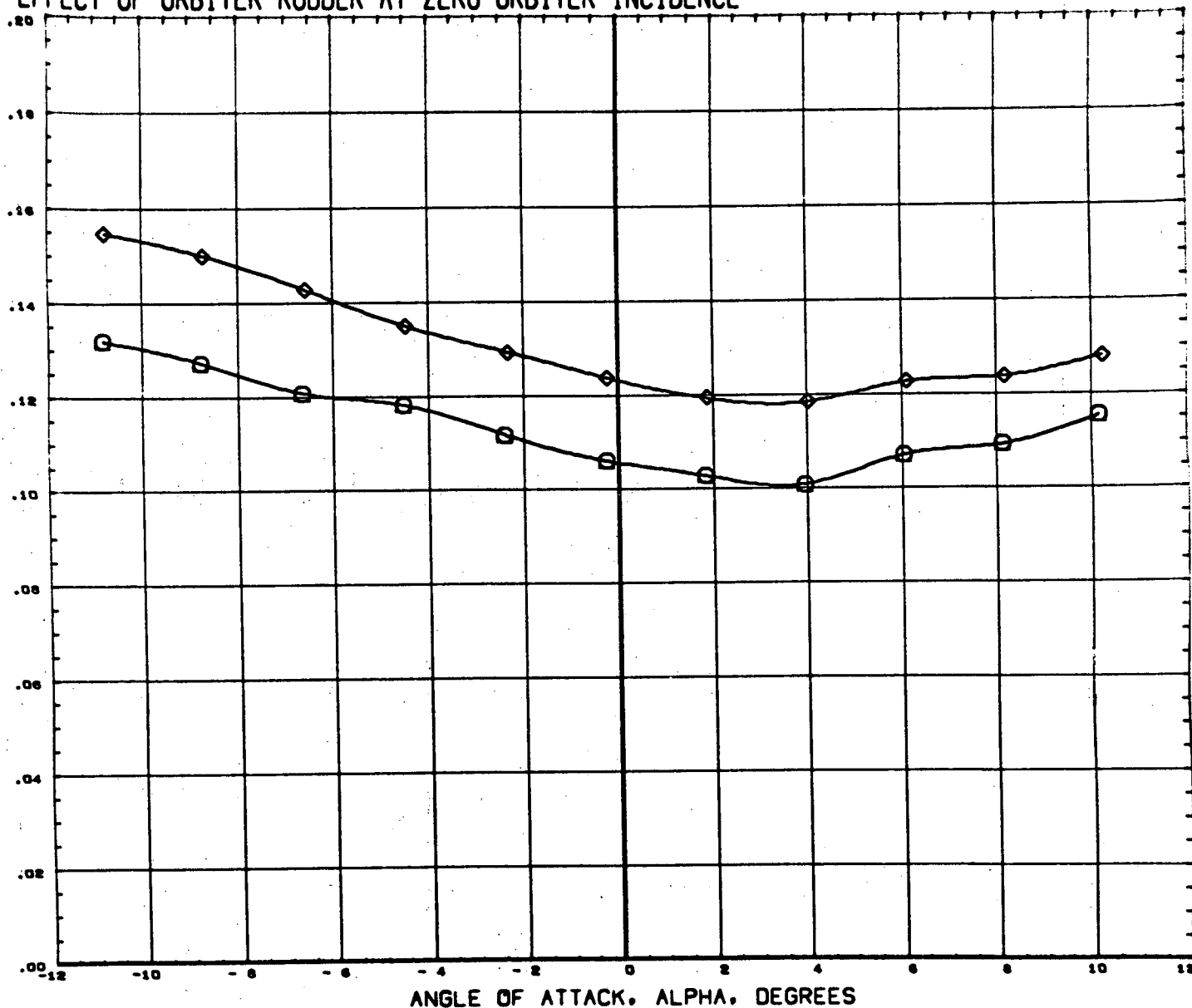


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

BASE AXIAL FORCE COEFFICIENT, CAB

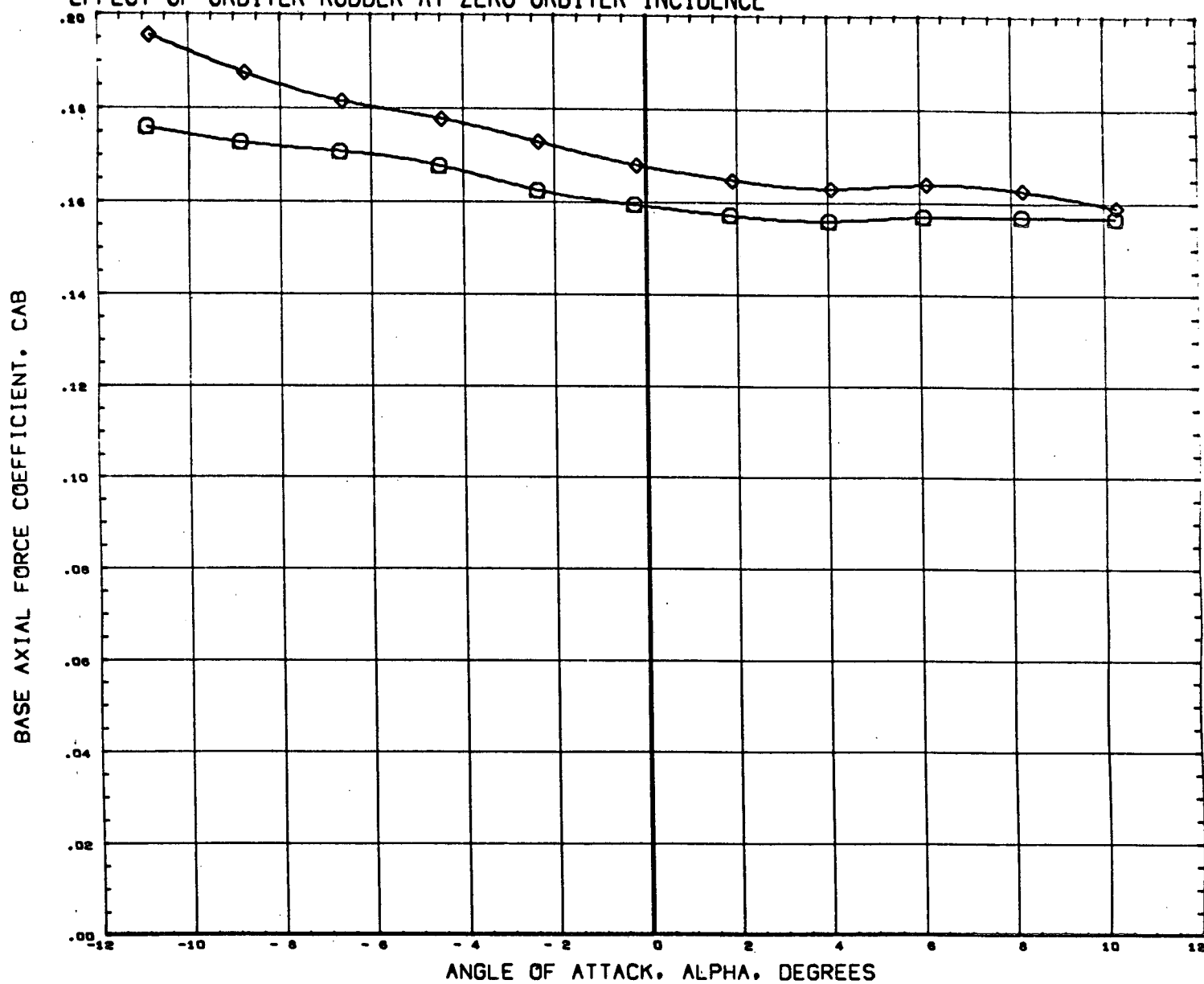


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30151 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

.90

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



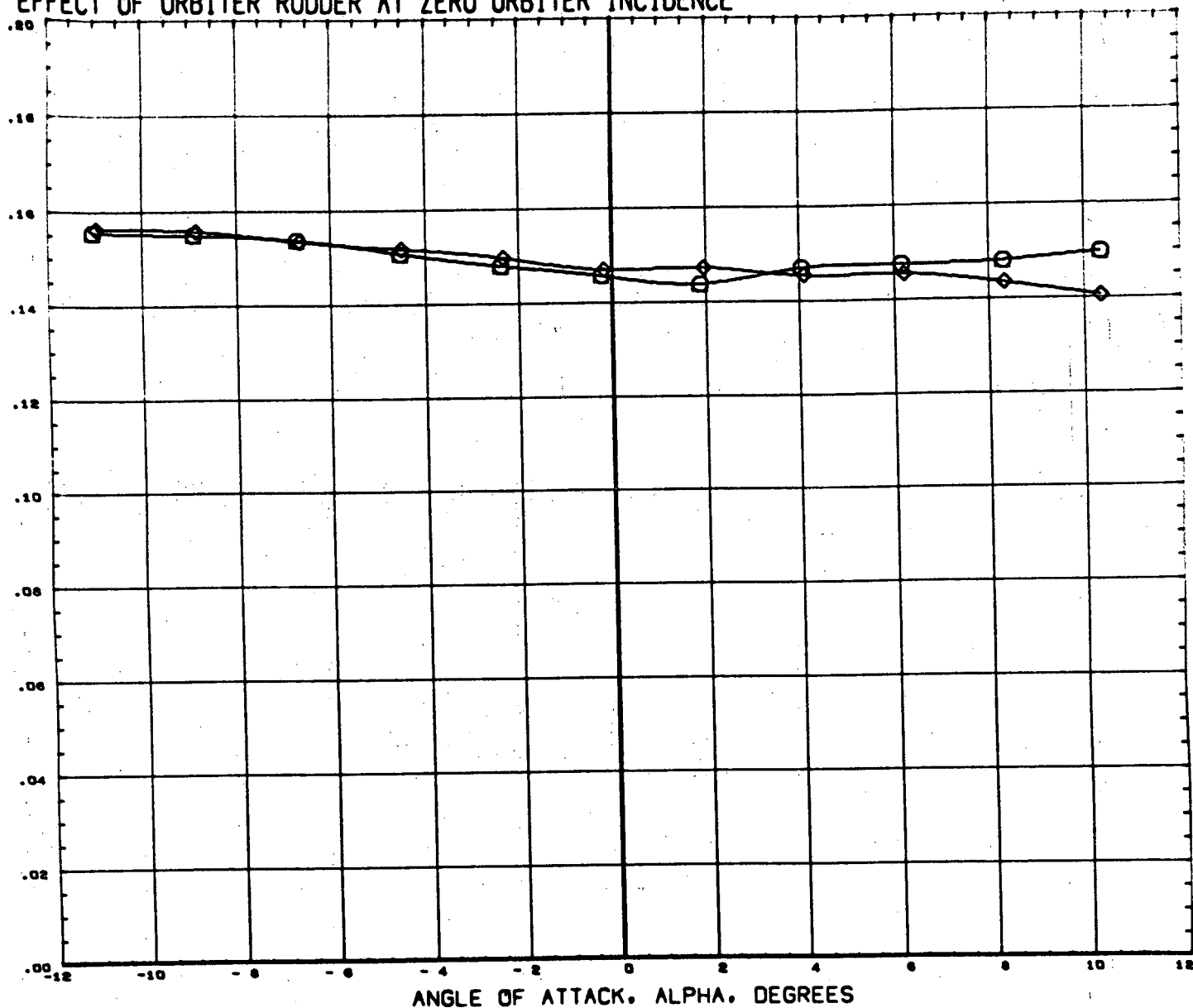
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

BASE AXIAL FORCE COEFFICIENT, CAB



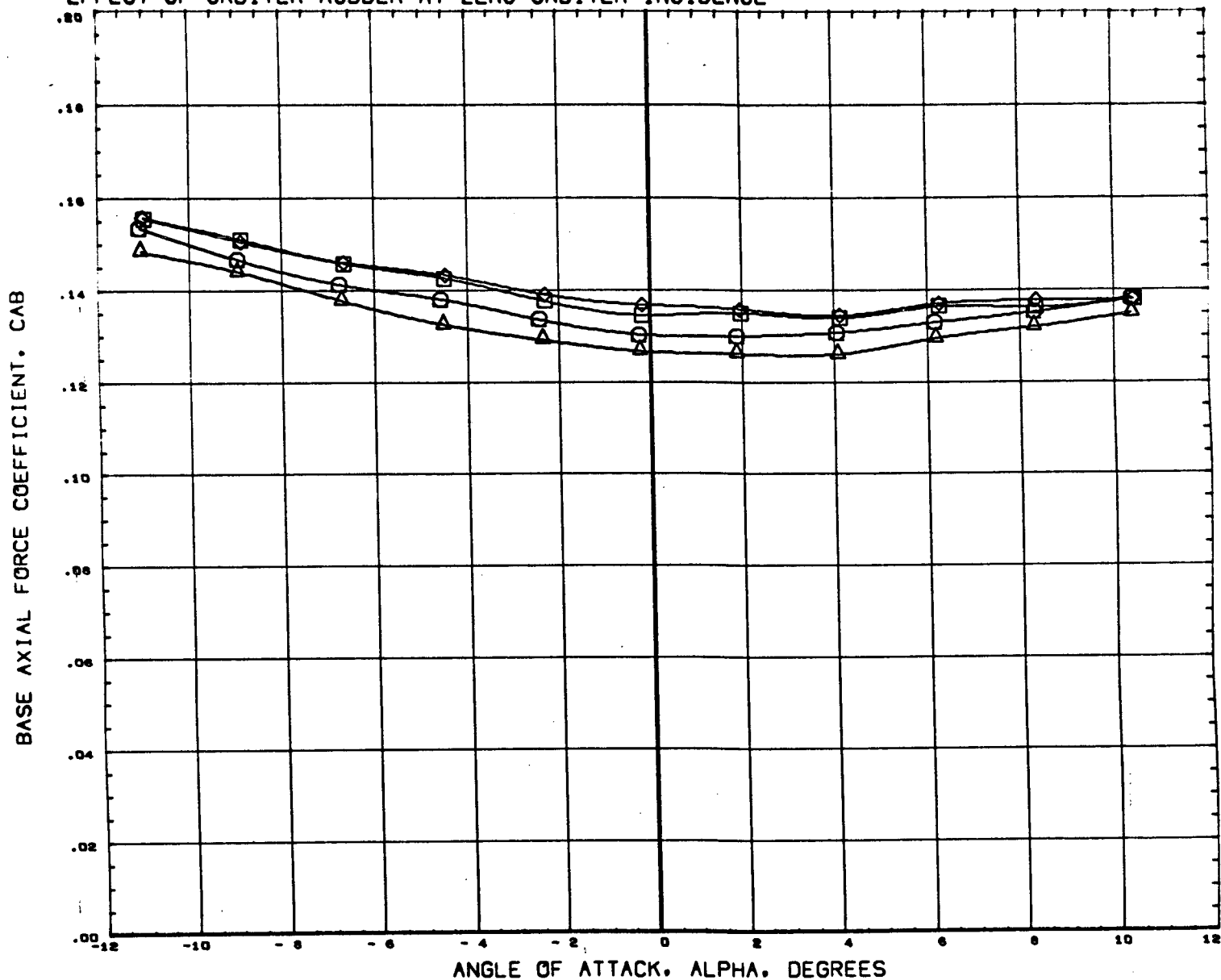
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|-----------------|---------------------------------------|--------|
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| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | TSO1S1 |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XHRP | 3.3600 IN. |
| | | | | YHRP | 0.0000 IN. |
| | | | | ZHRP | 0.2460 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH 1.10

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

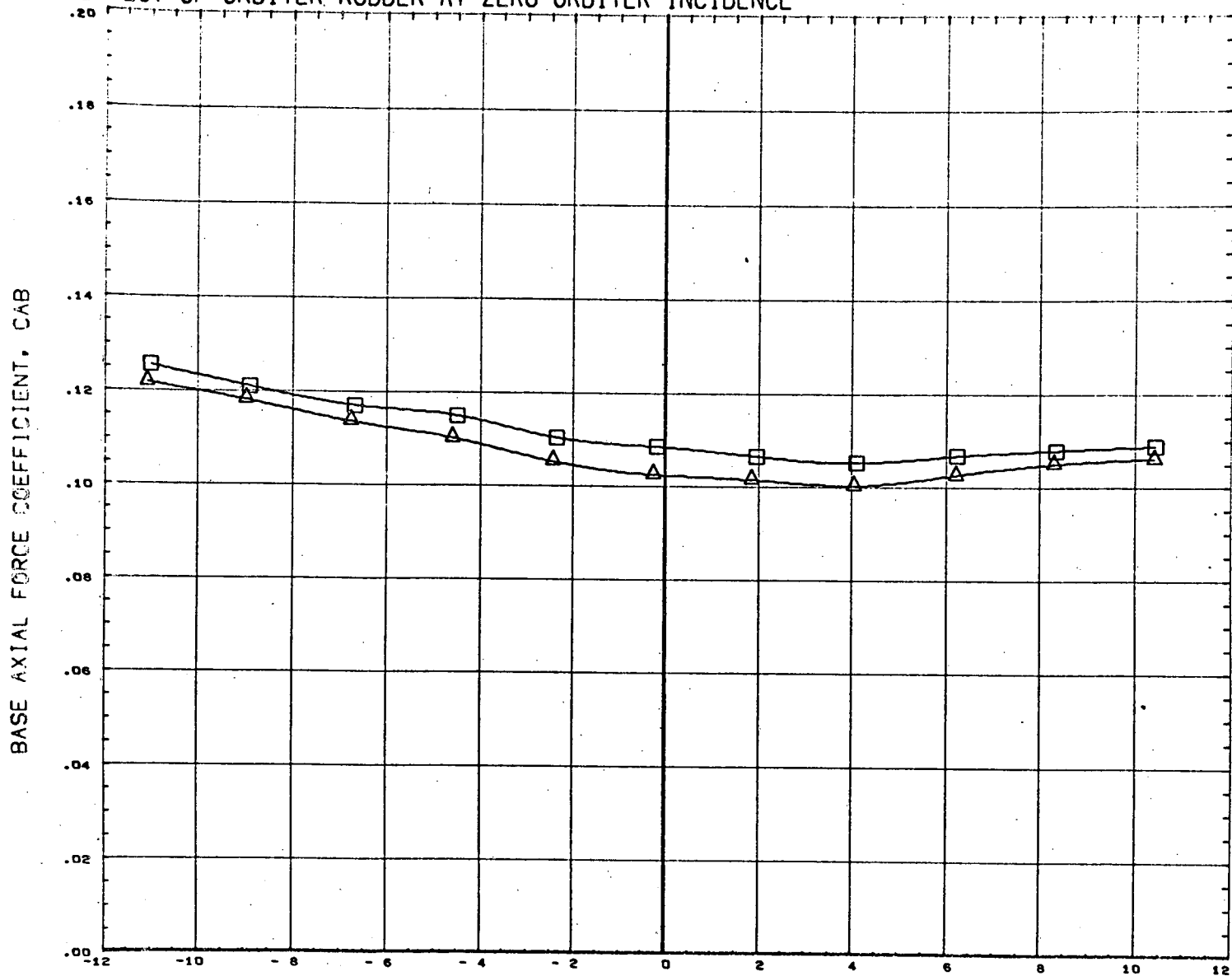


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8900 | SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.20

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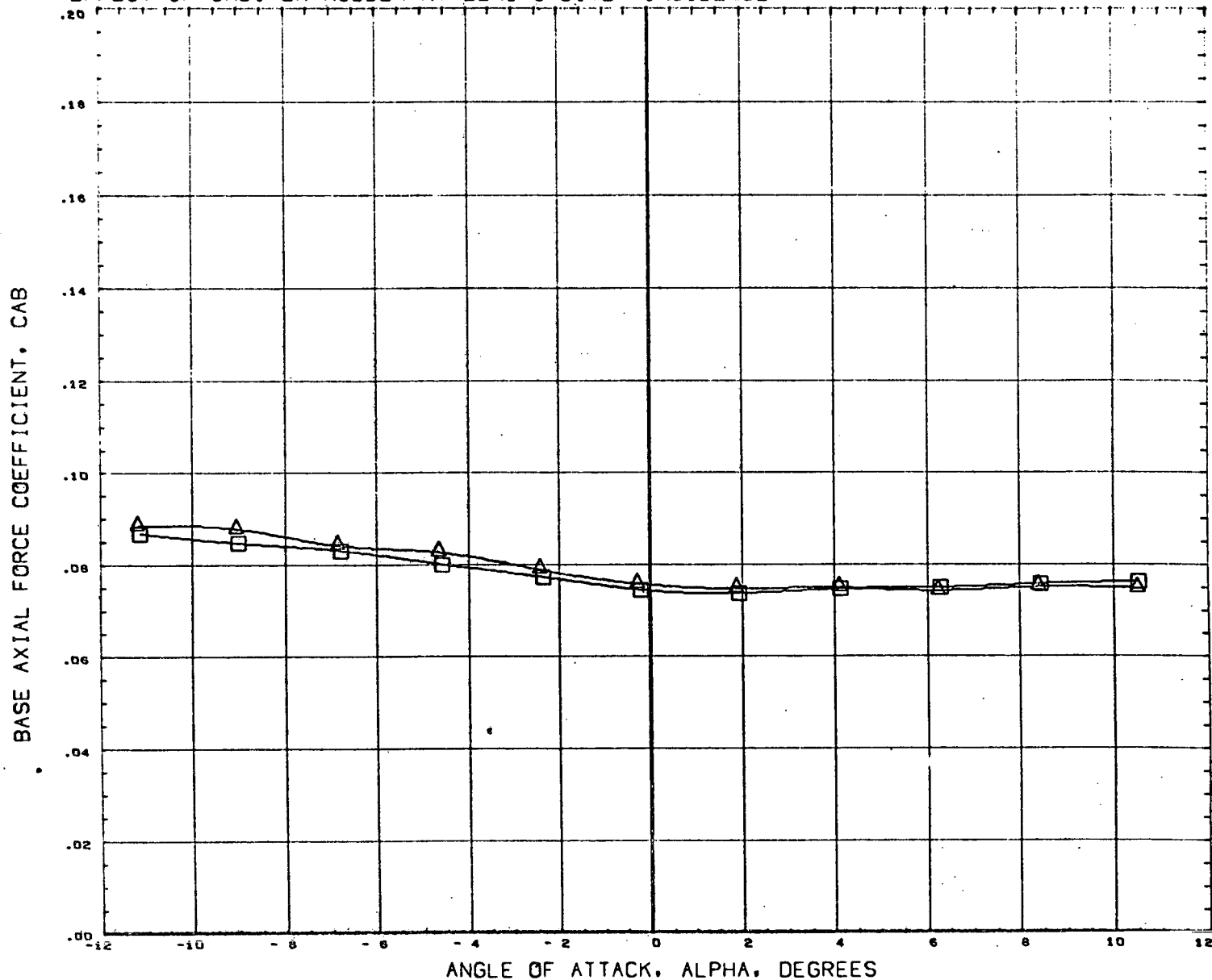
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71099) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



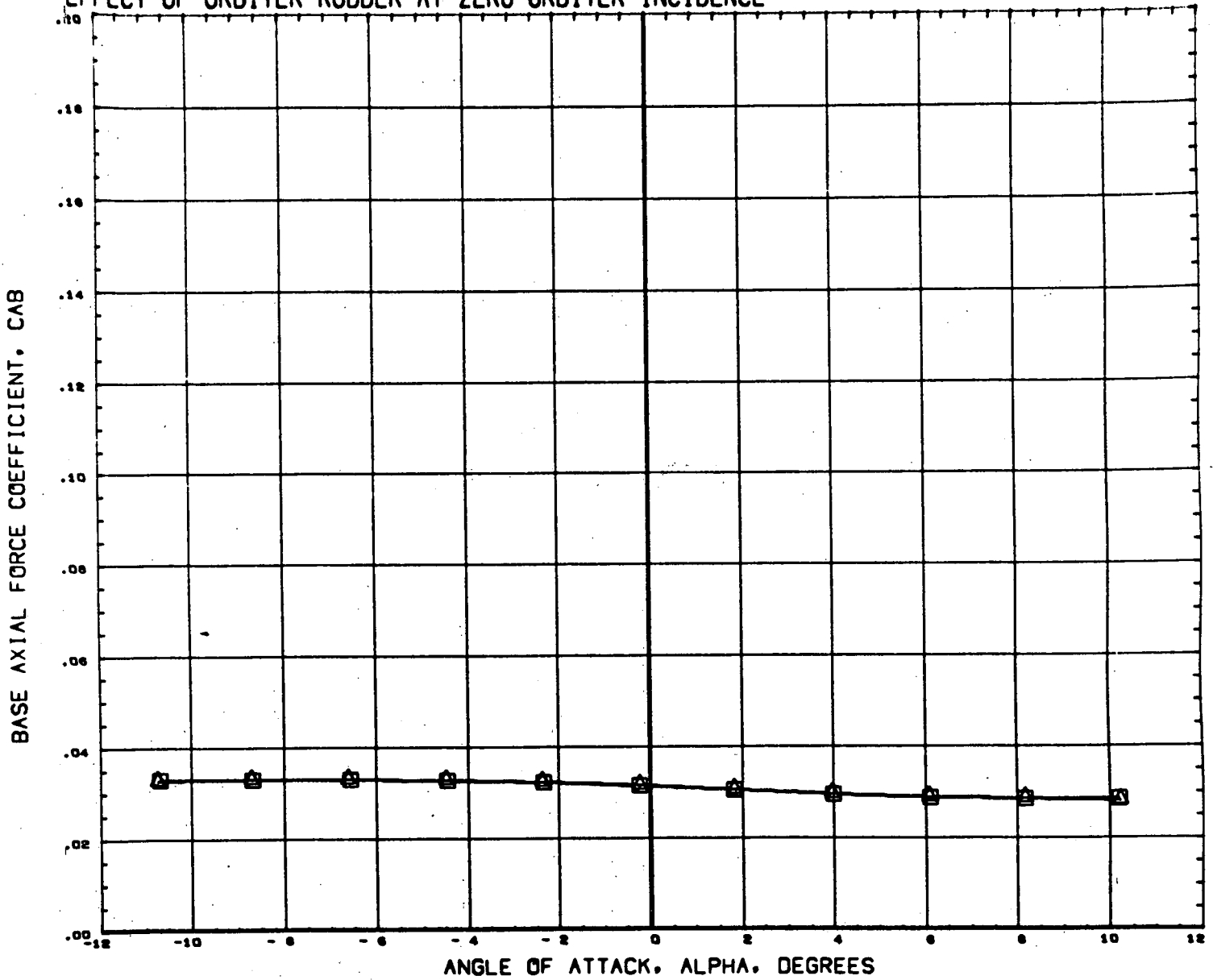
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORDINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71043) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.95

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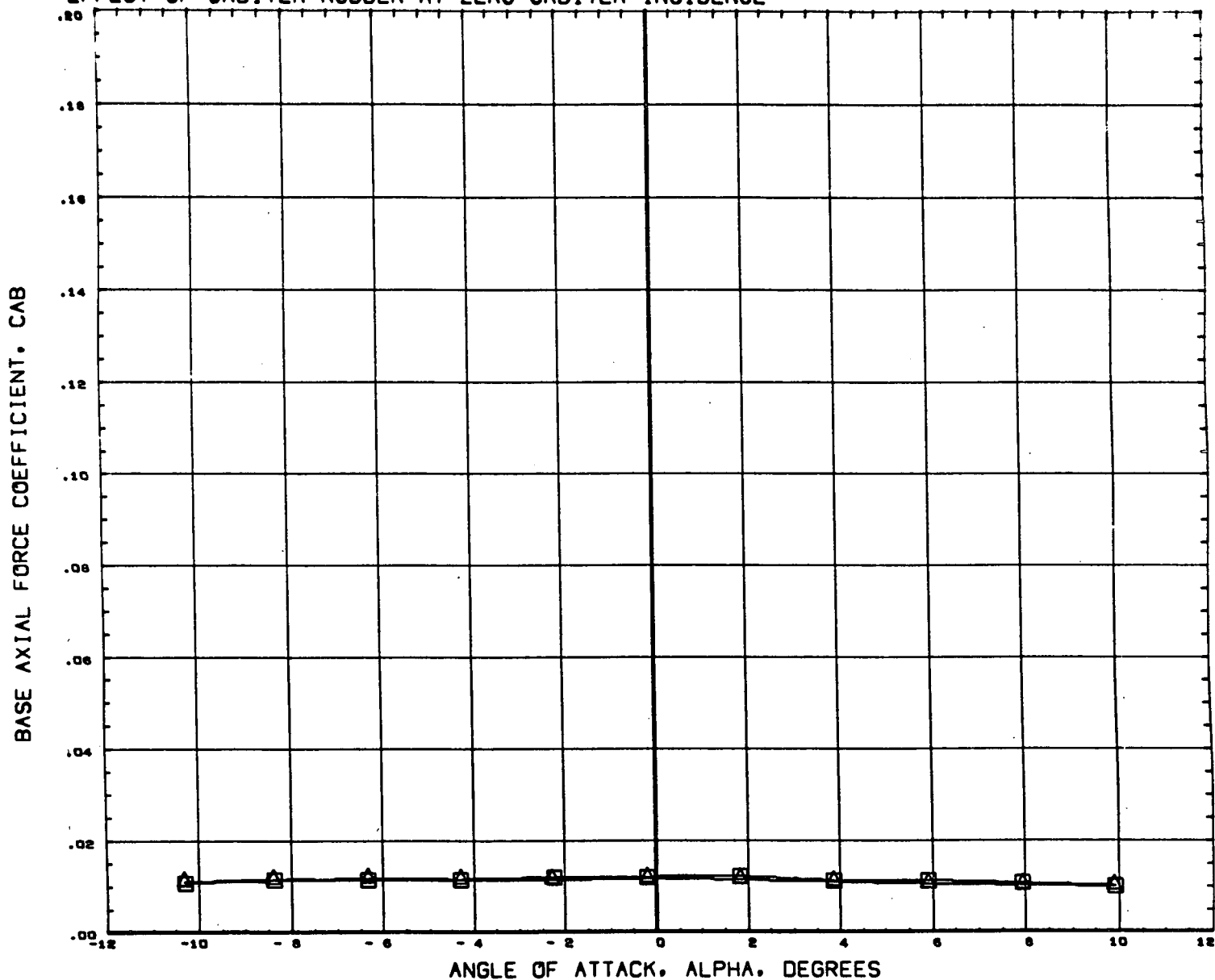
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71069) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



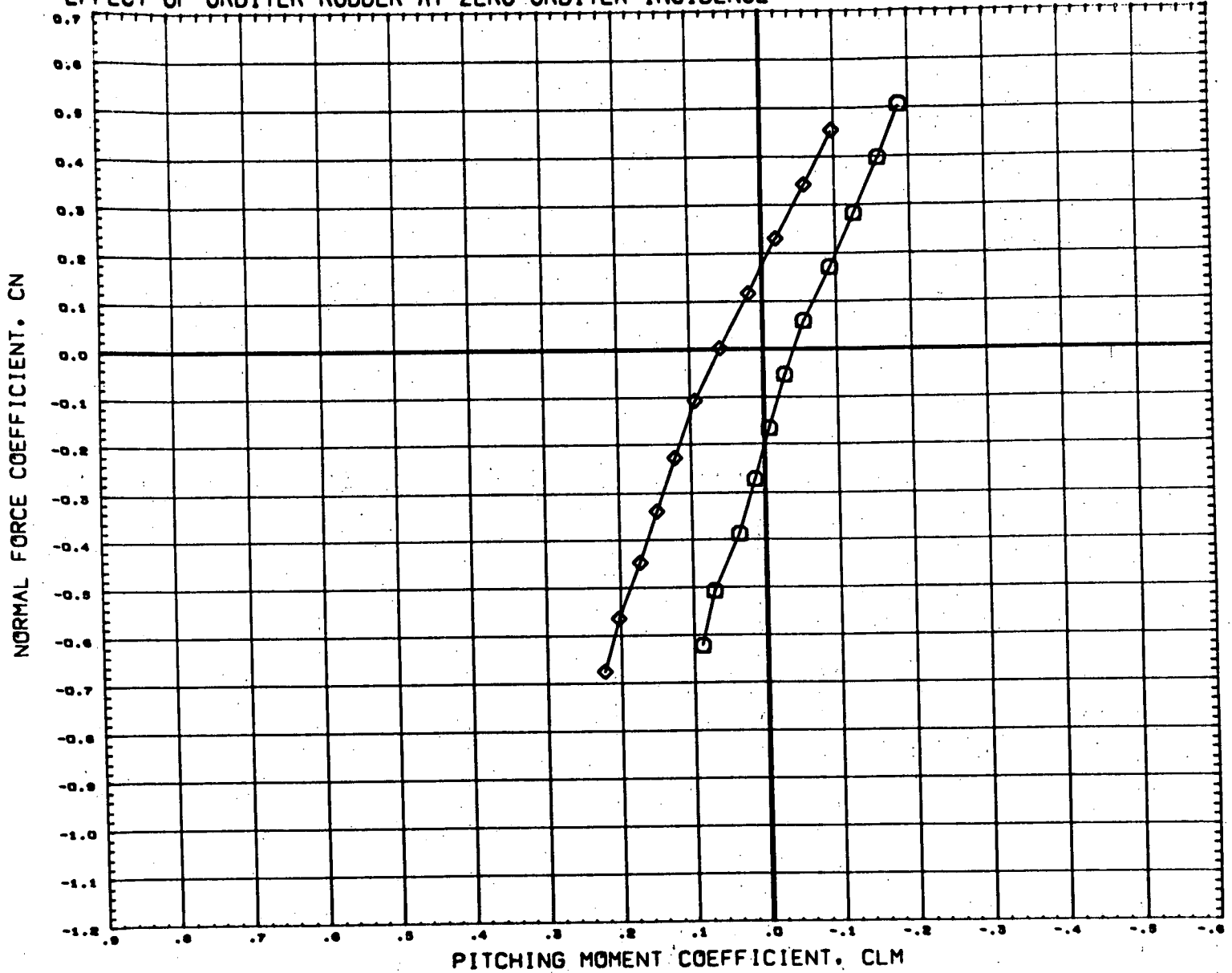
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 30. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 | IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH

4.96

PAGE 468

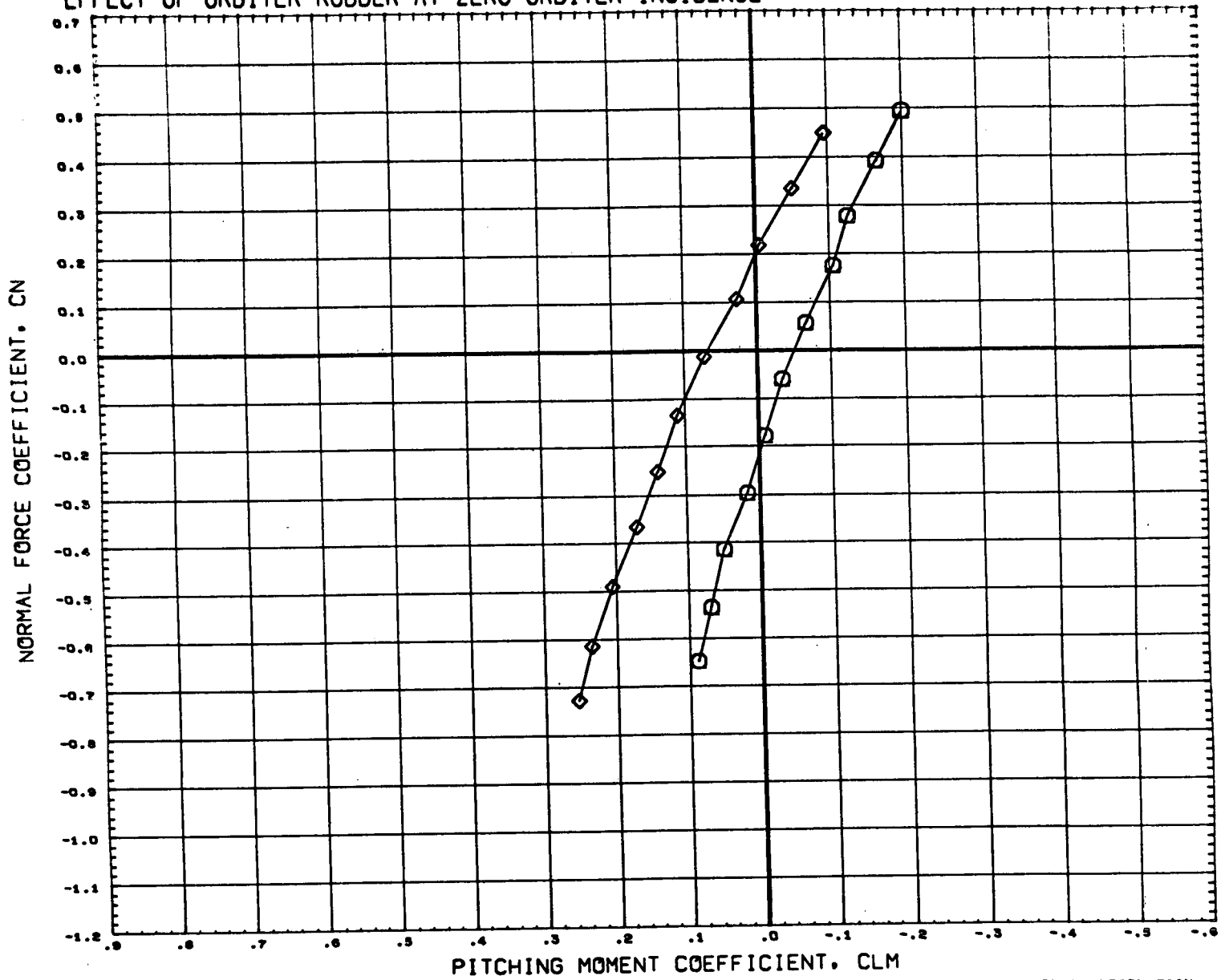
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (871088) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

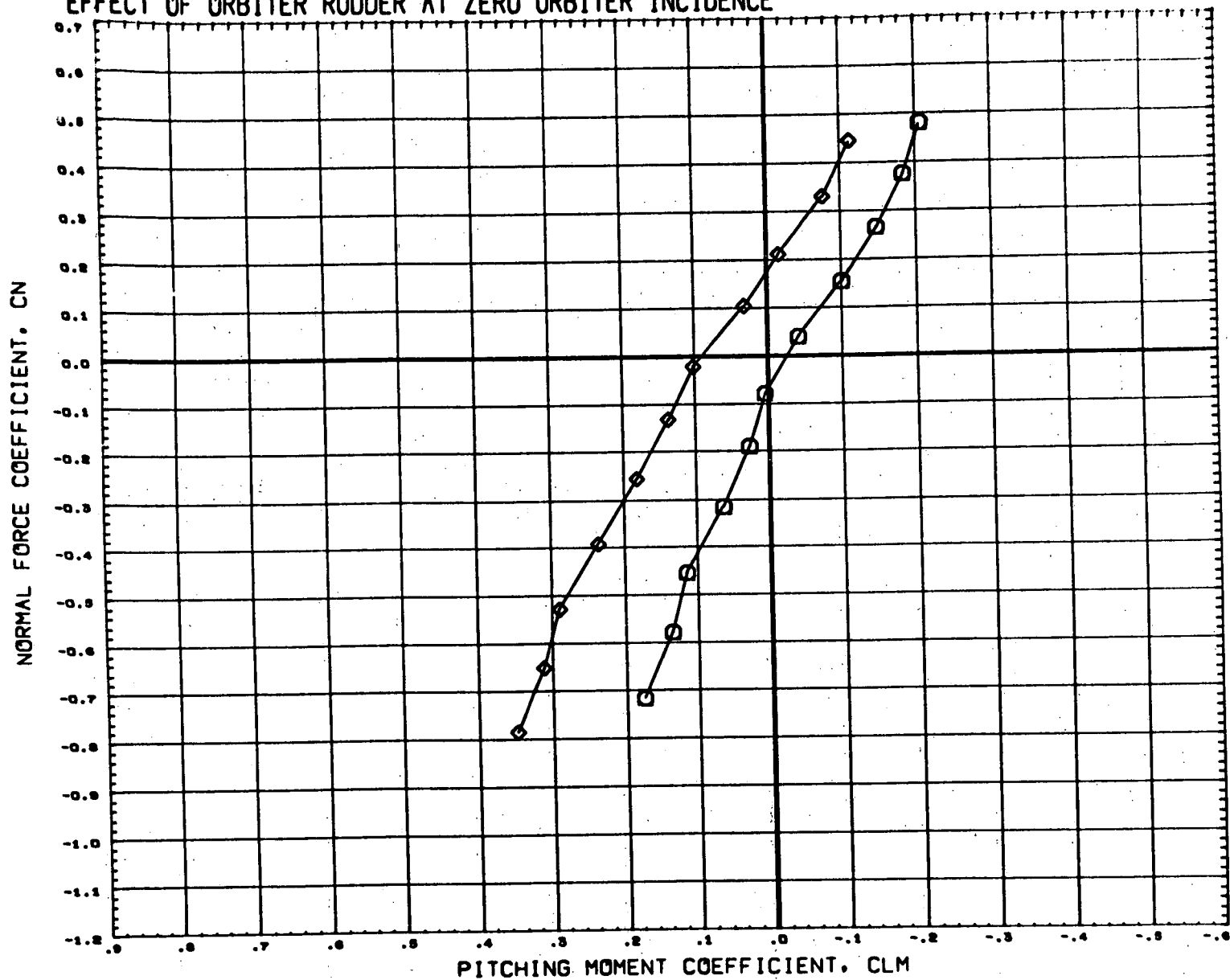


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

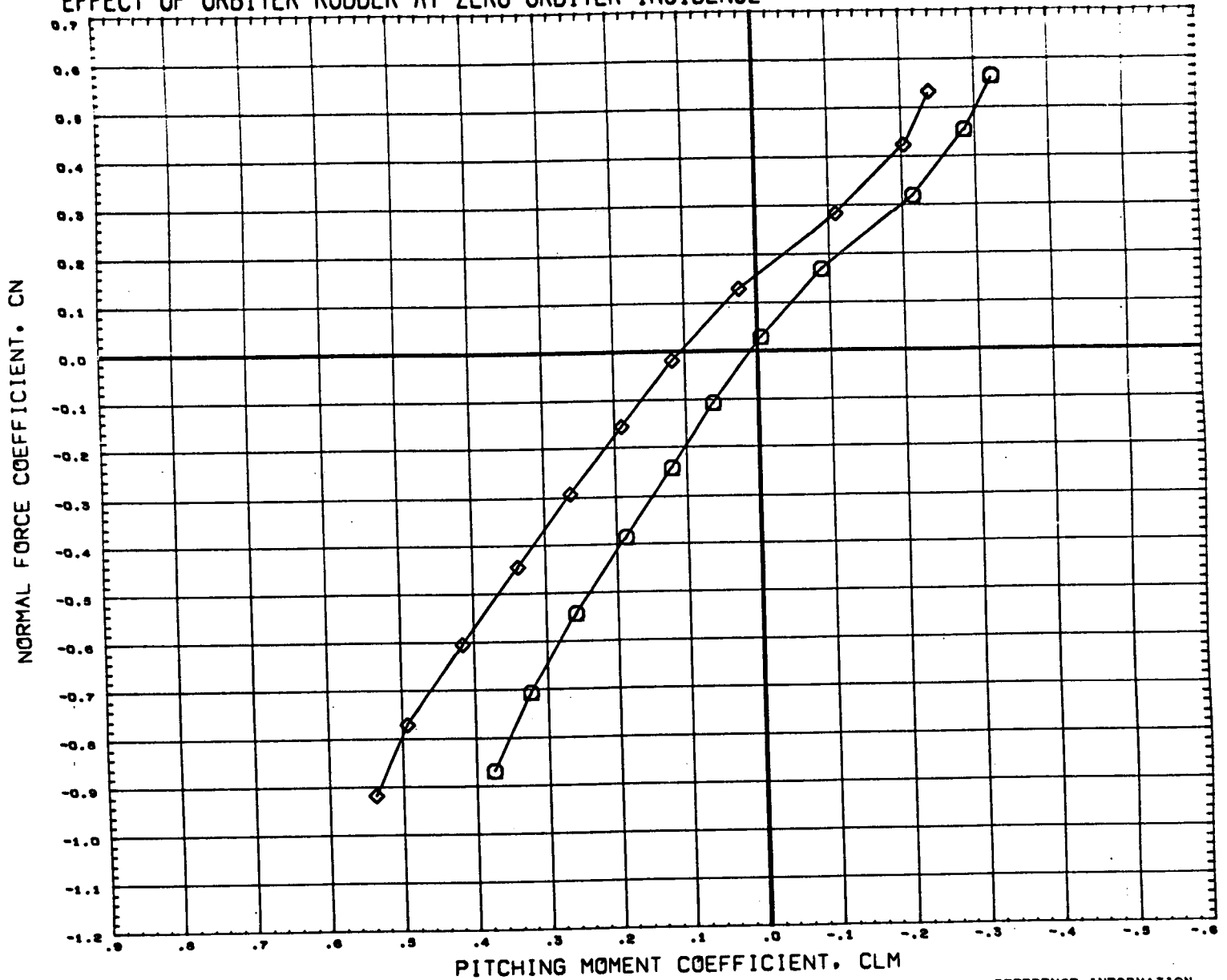
MACH .80

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



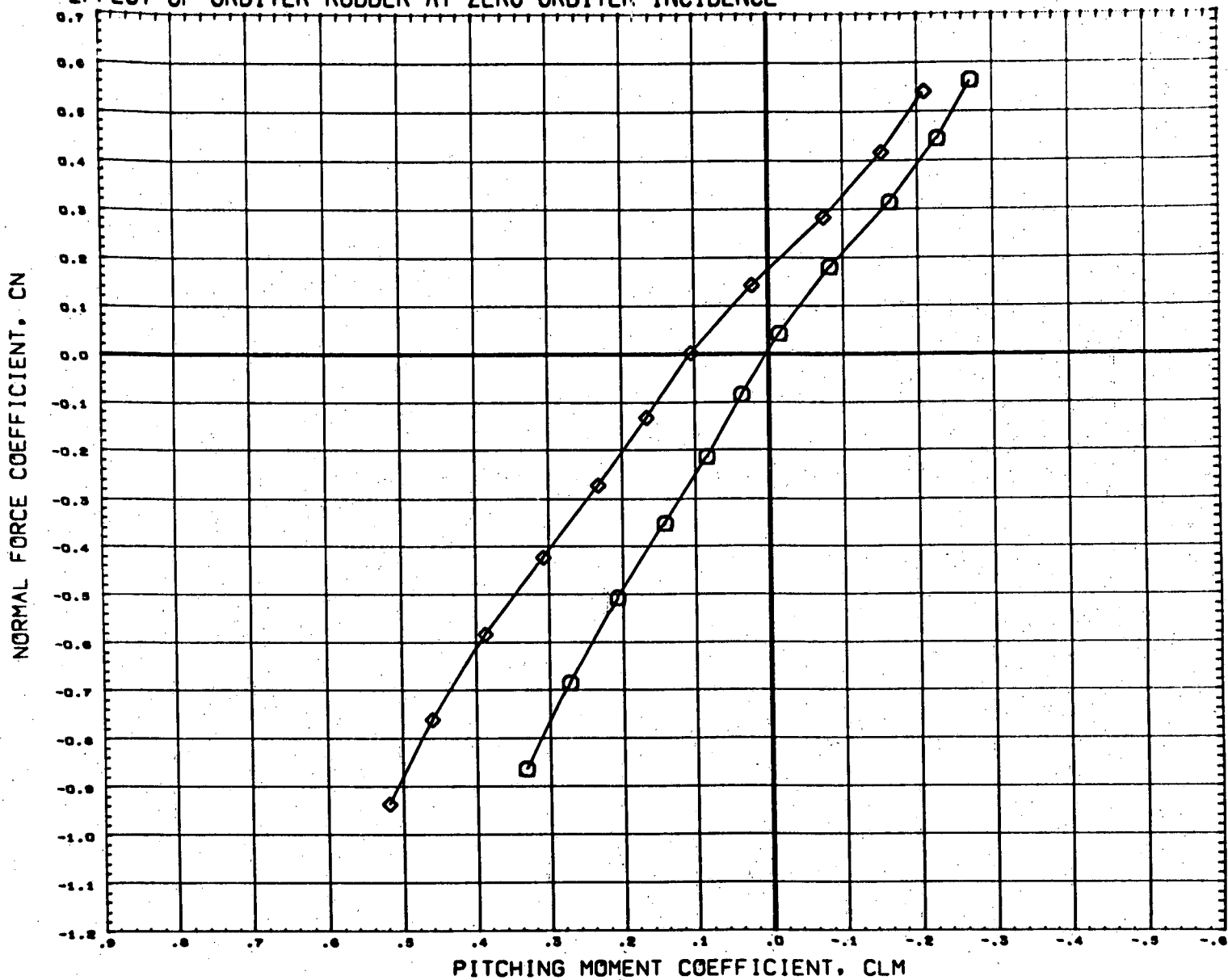
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT INC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-----------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



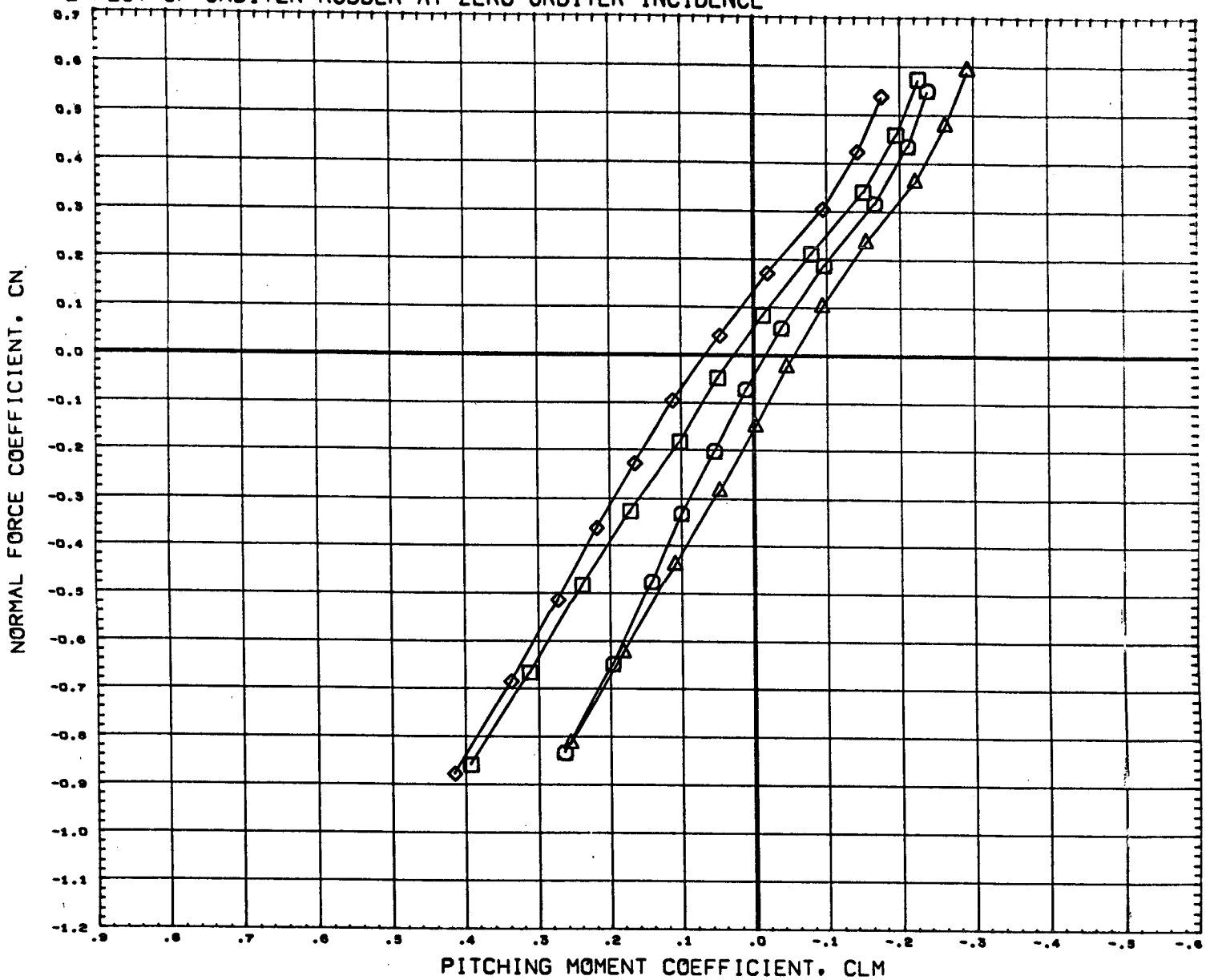
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT INC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-----------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.10

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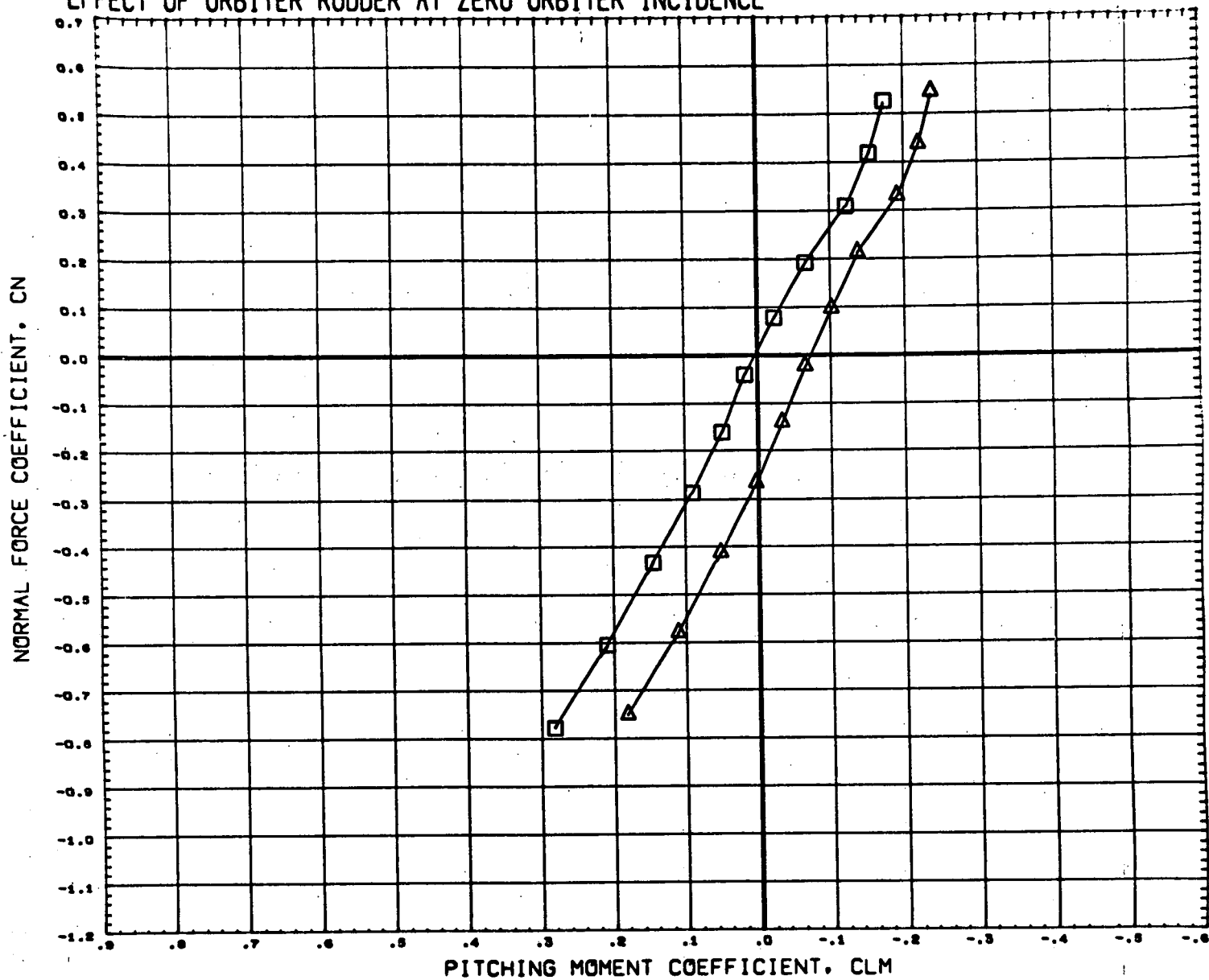
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4800 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3800 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

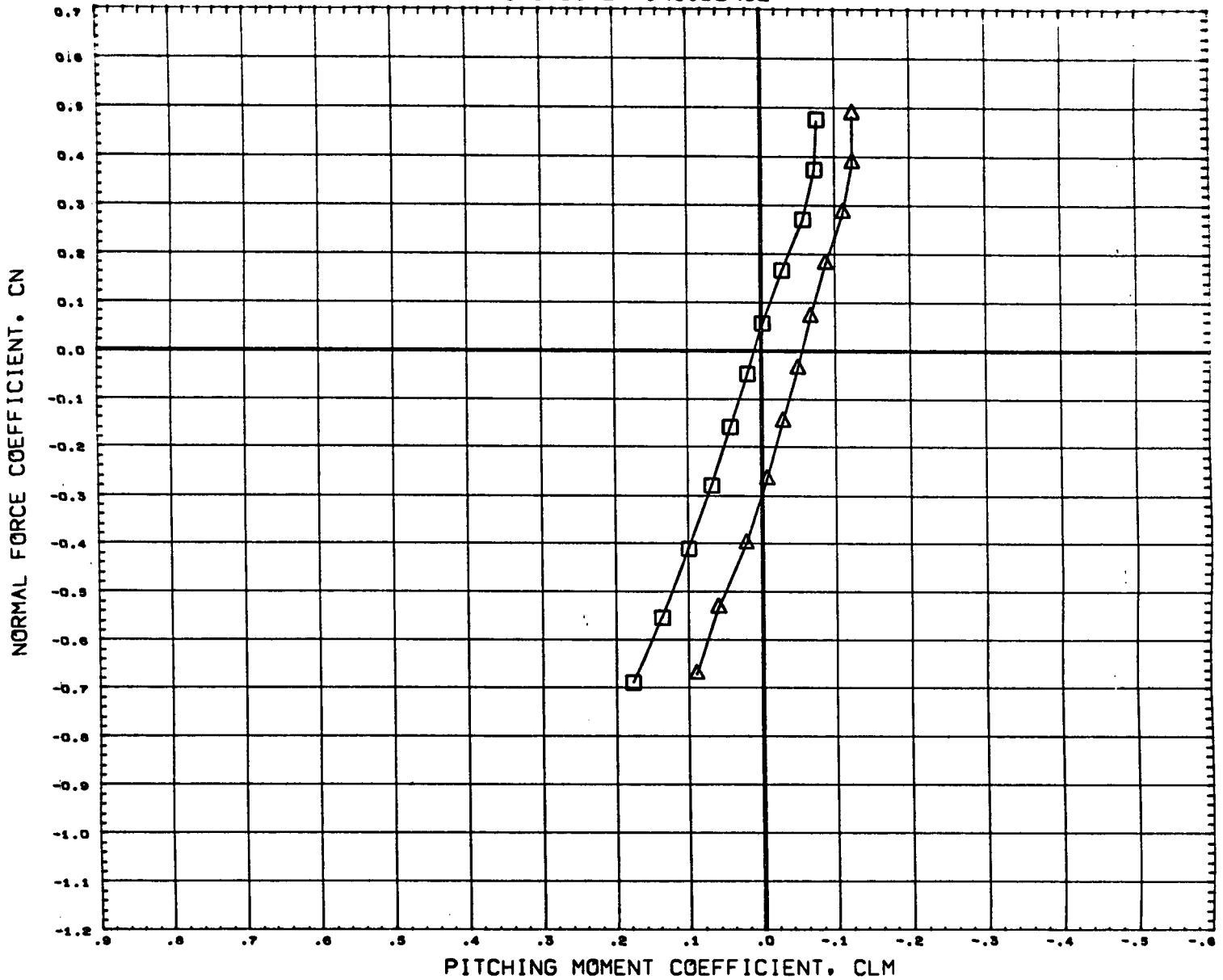


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 30.1N. |
| (B71091) | MSFC TWT S44X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT S44X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

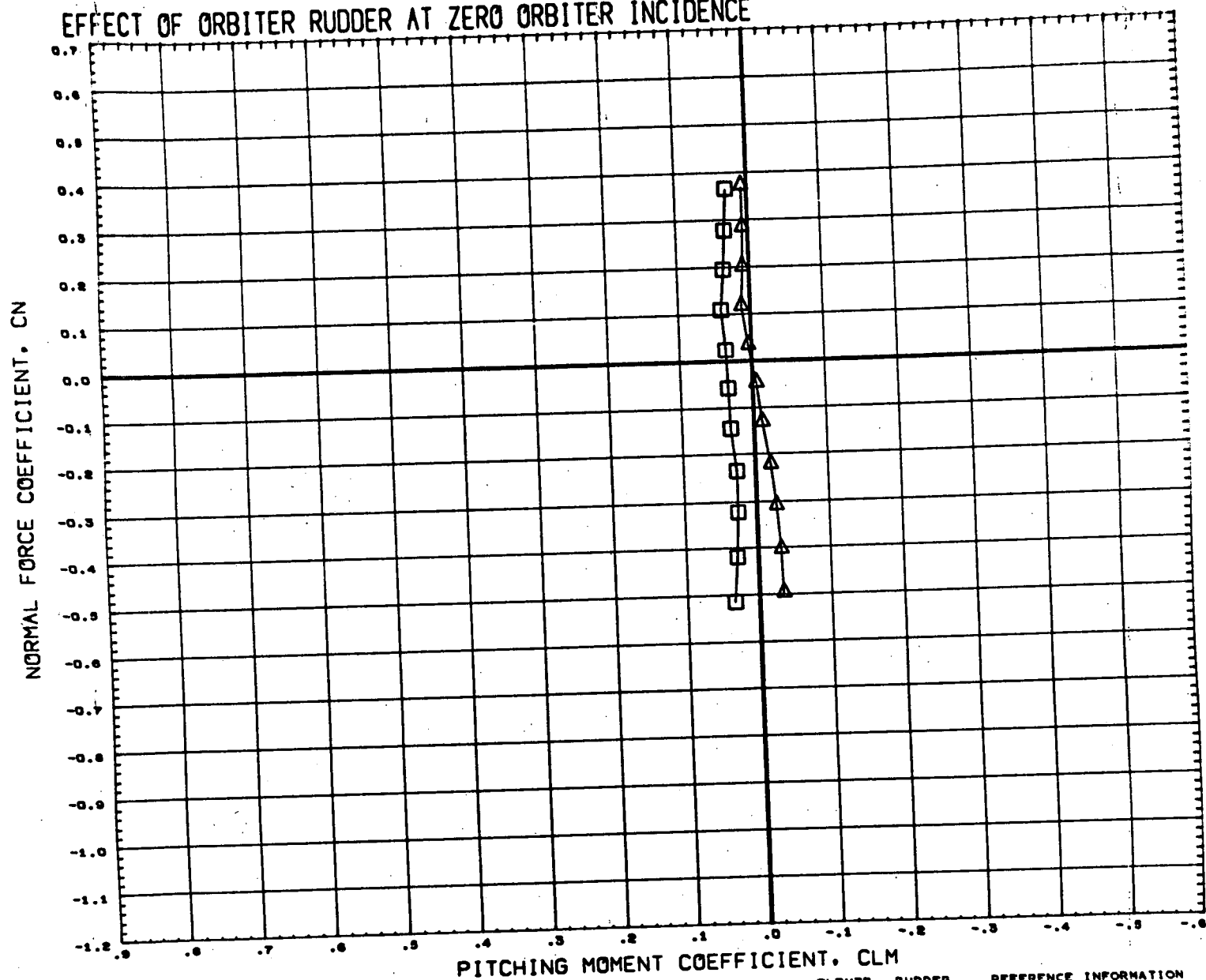


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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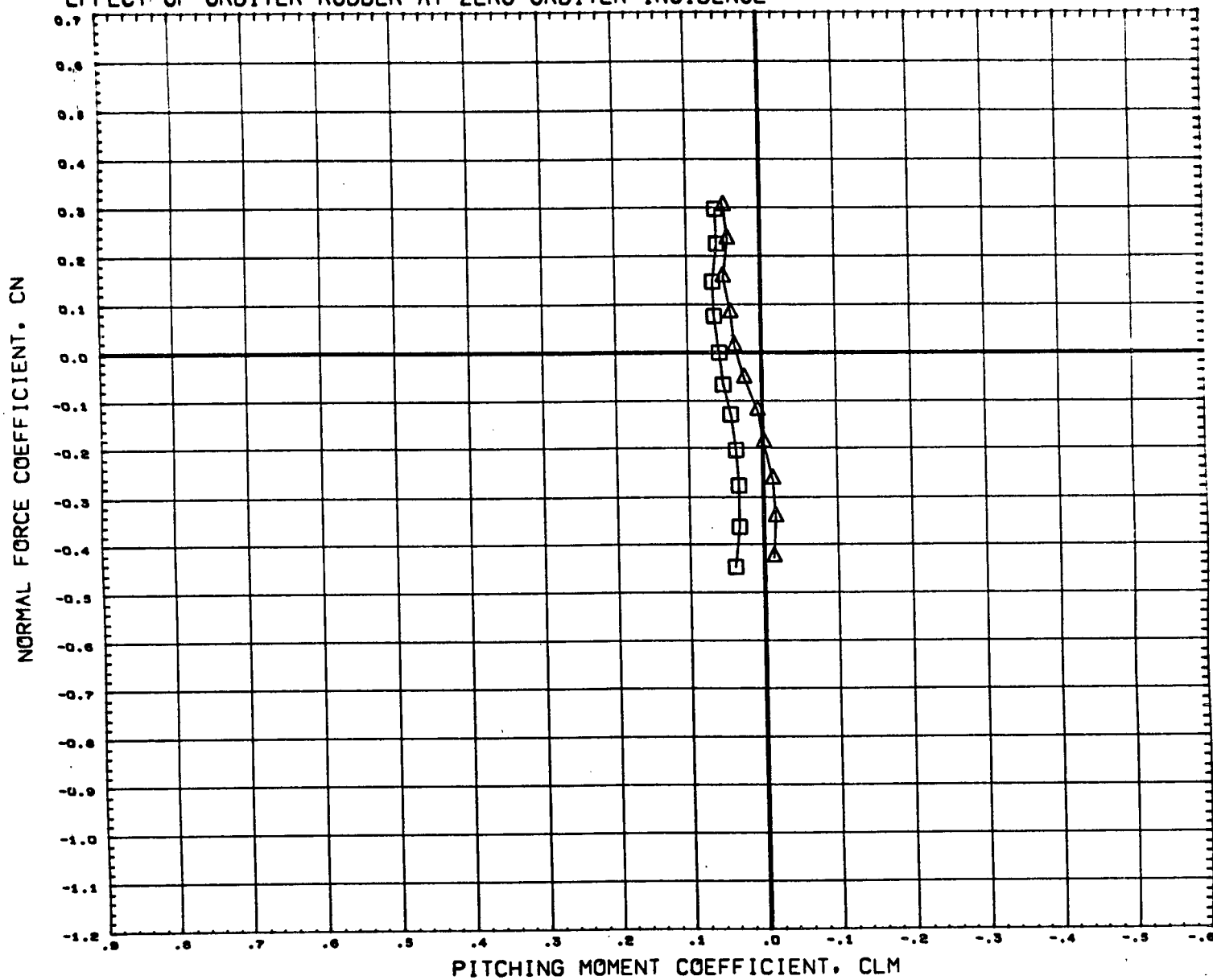
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | Y _S | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|----------------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| (871097) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

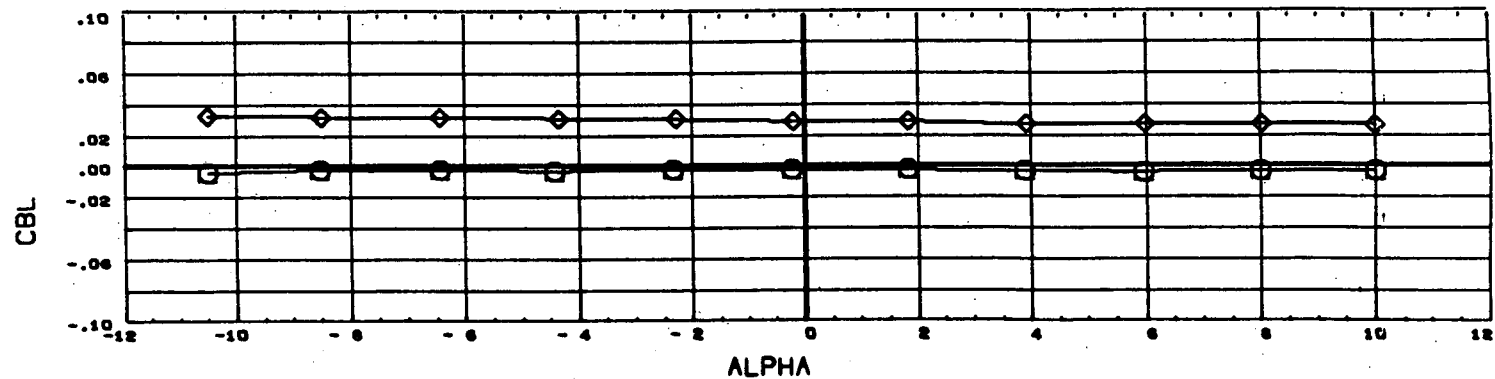
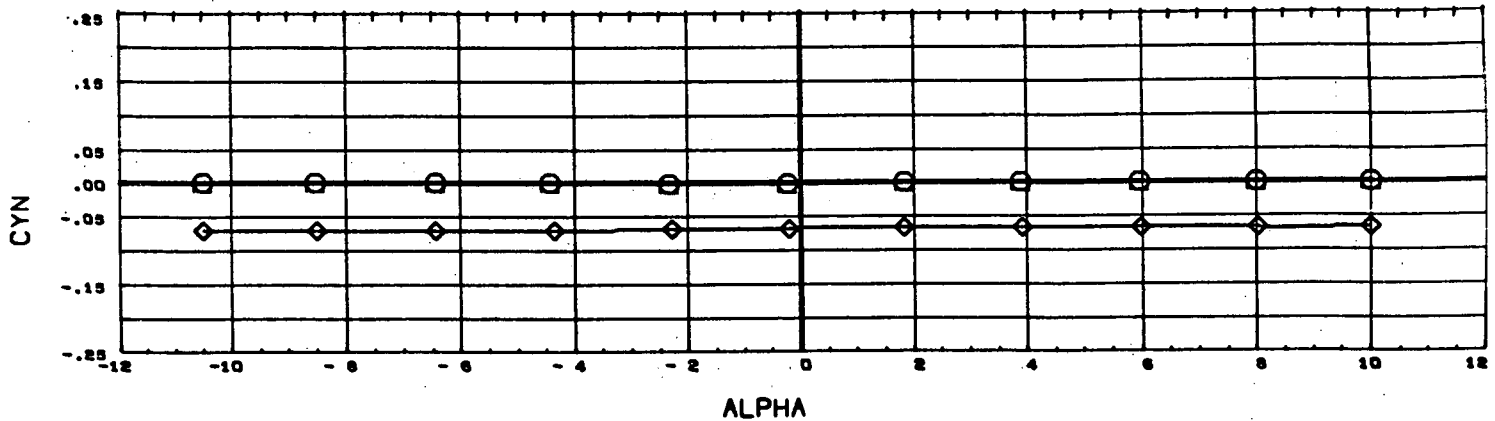
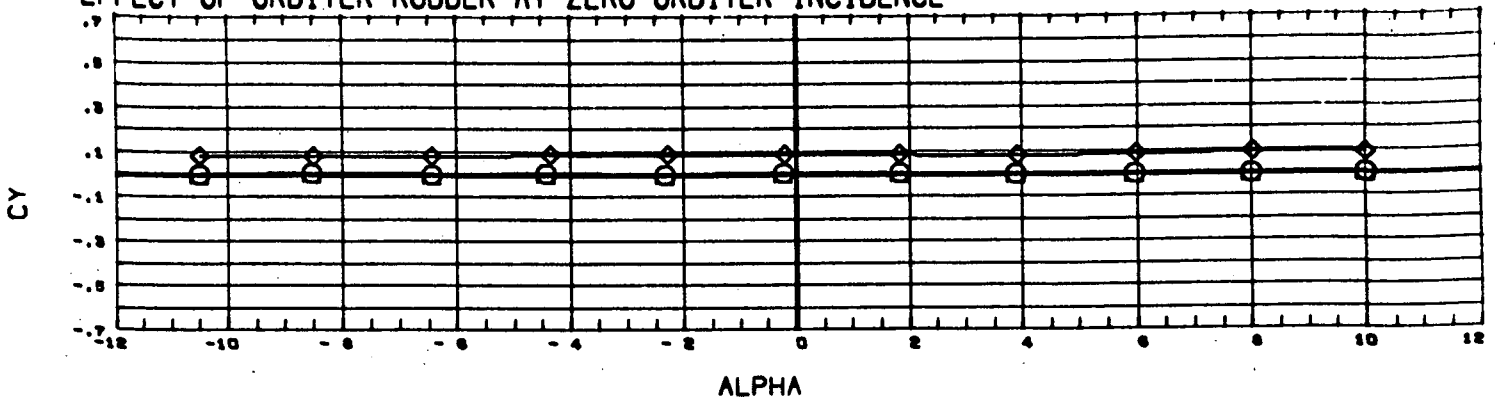
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER INC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

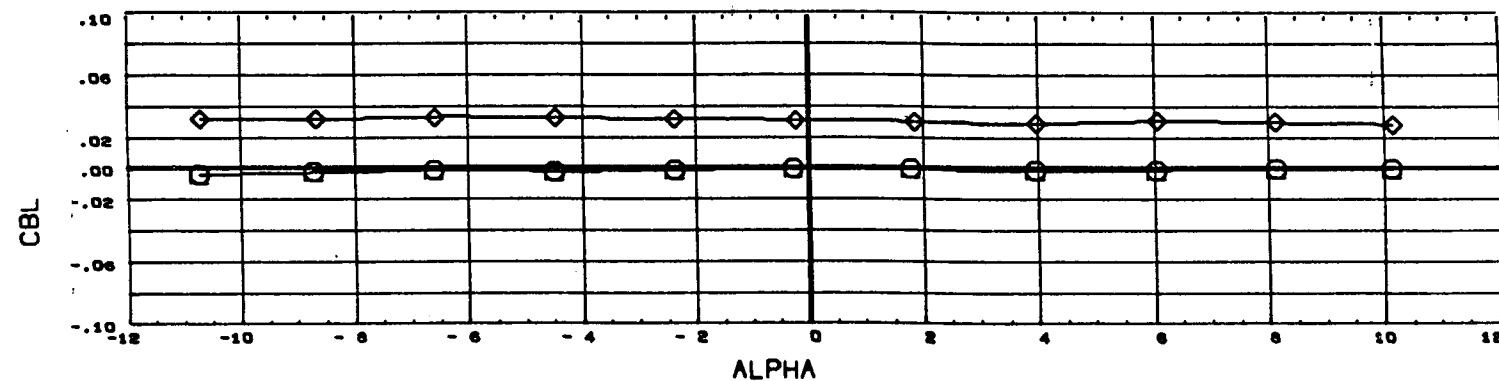
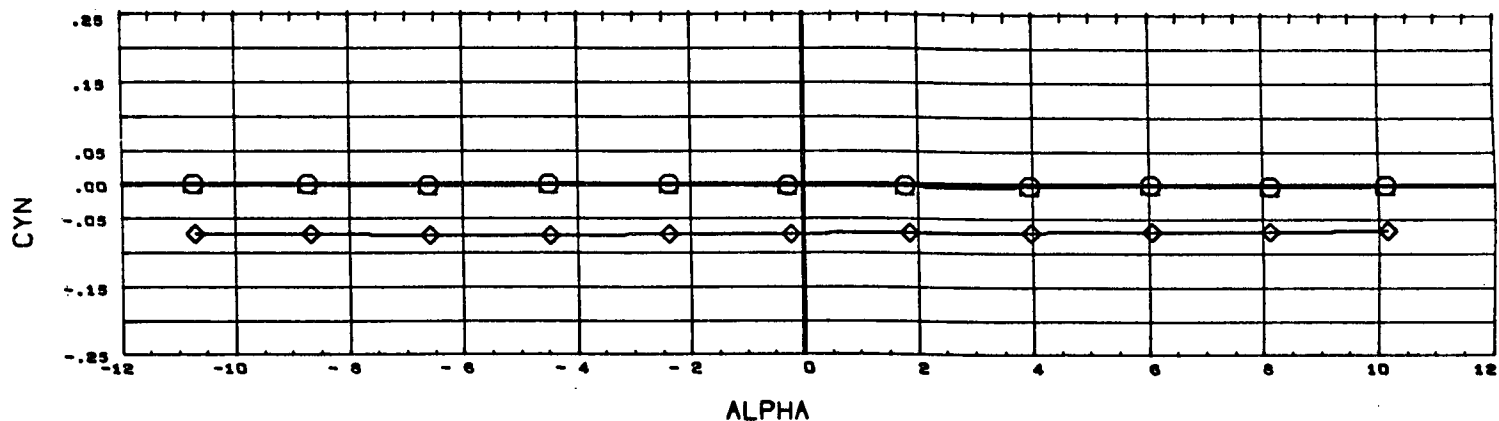
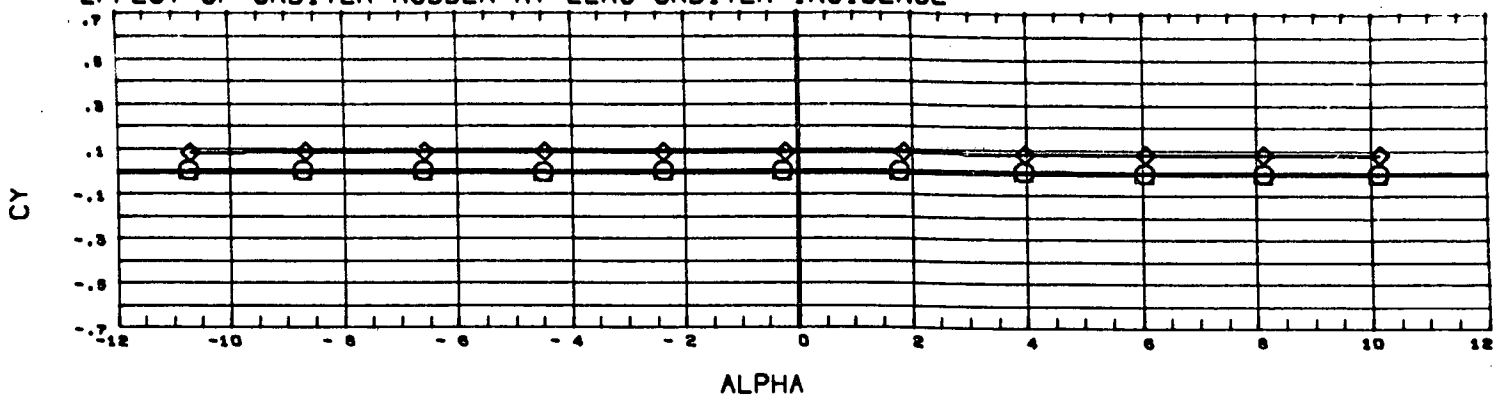
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

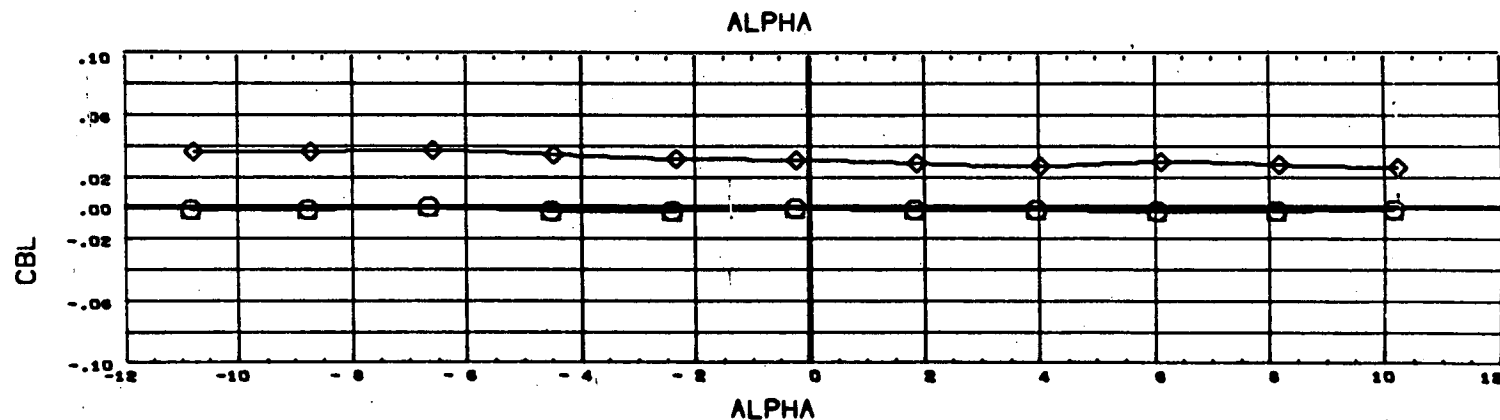
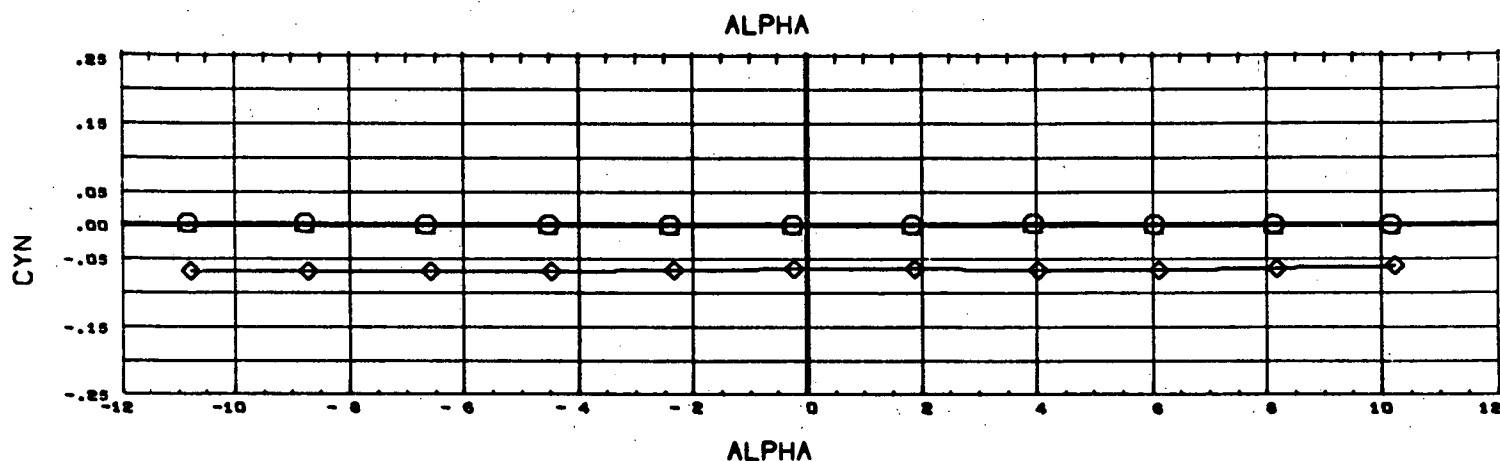
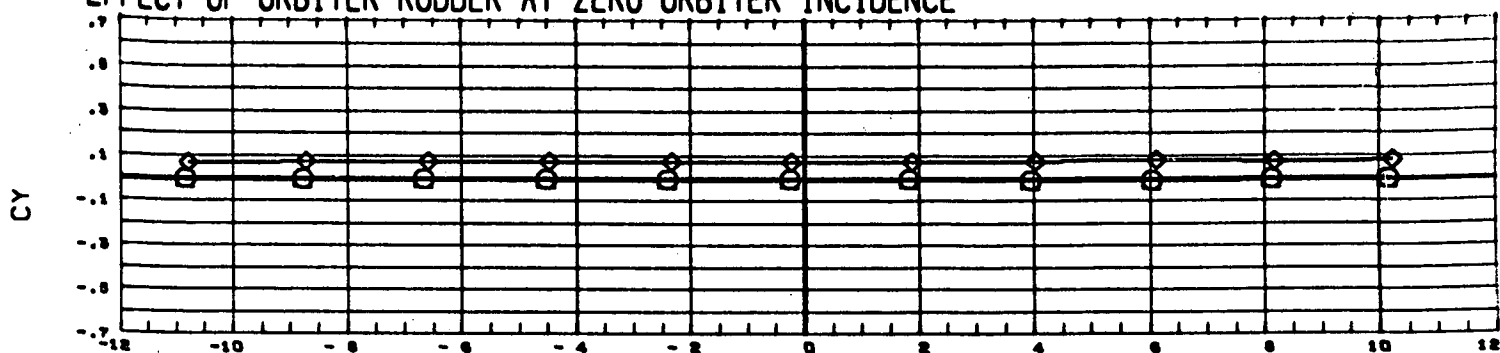


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

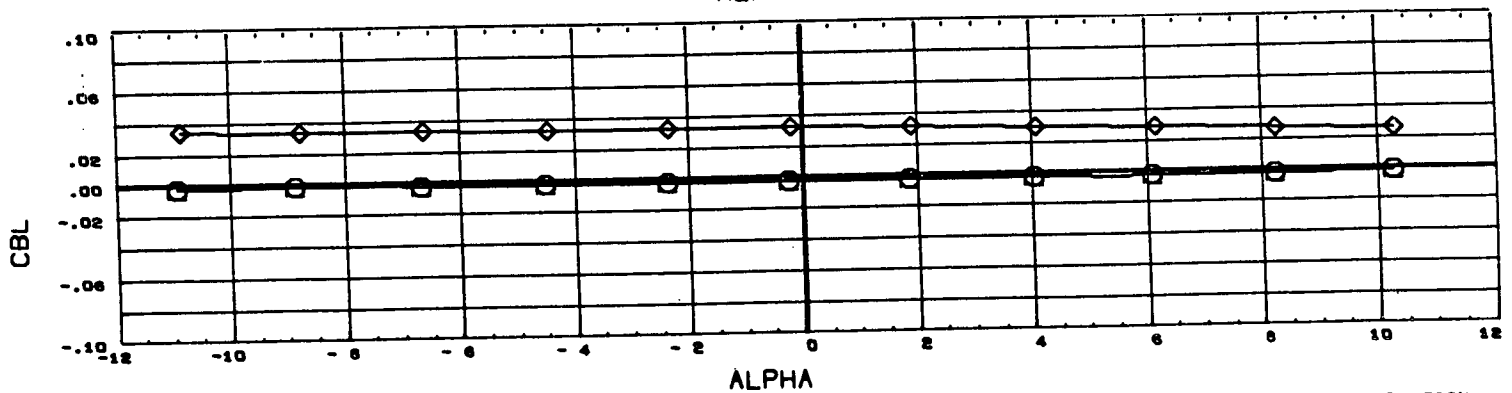
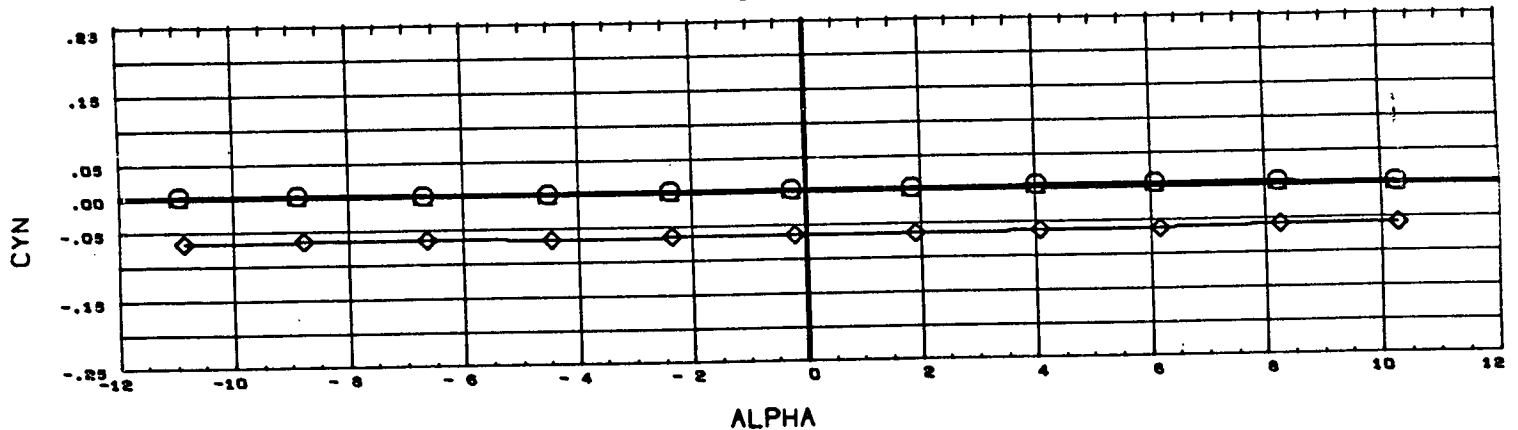
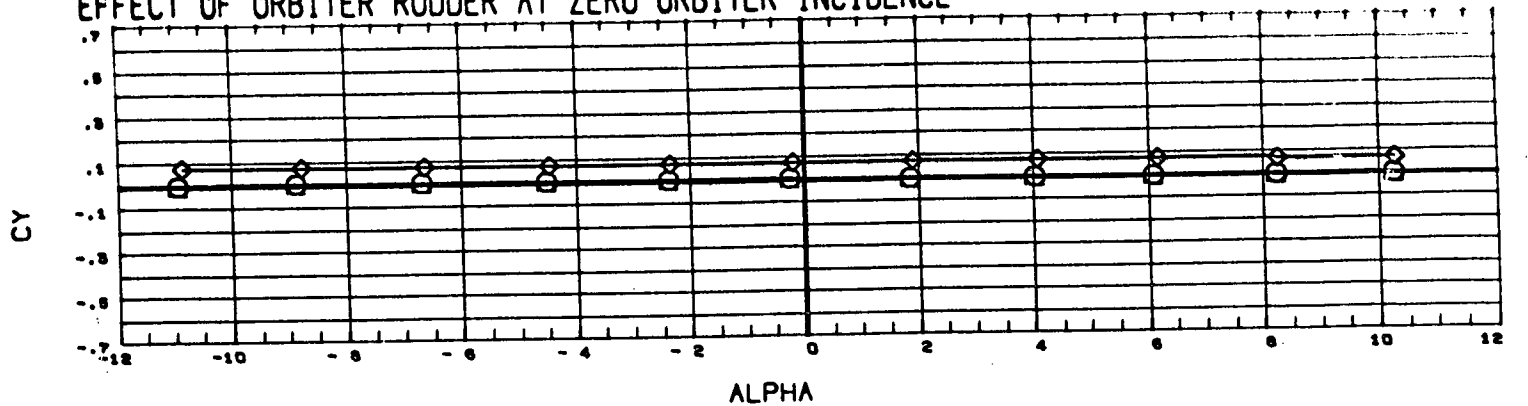


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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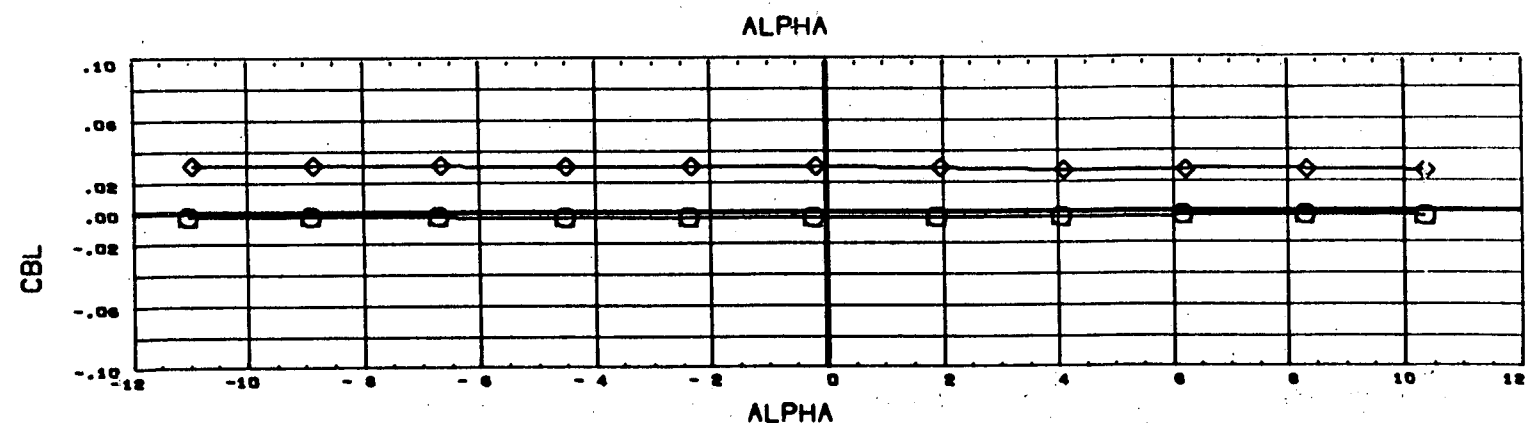
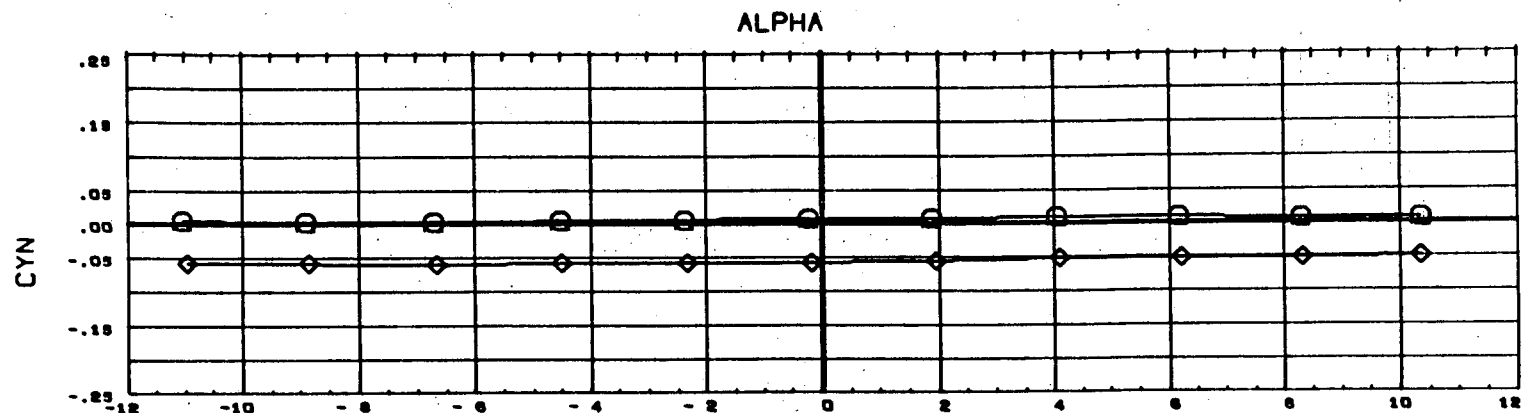
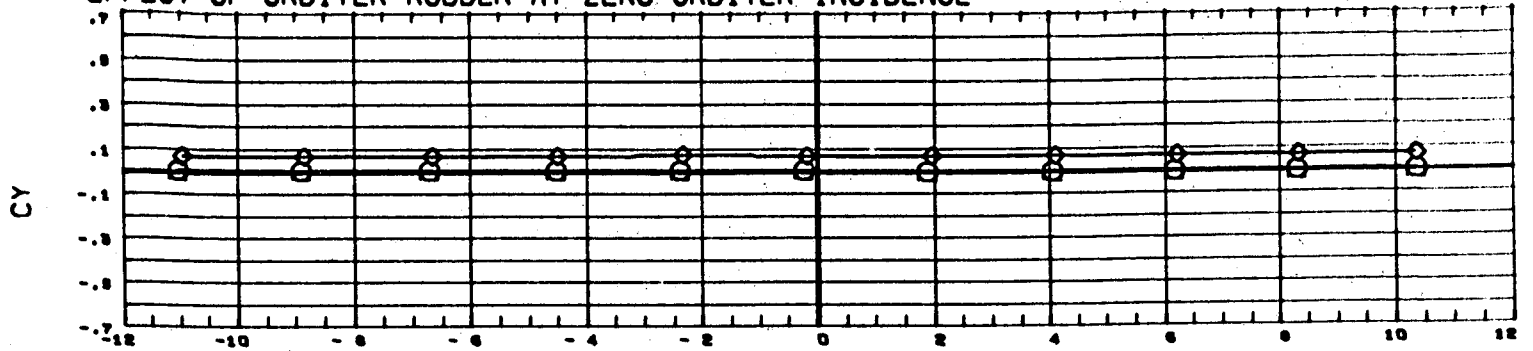
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

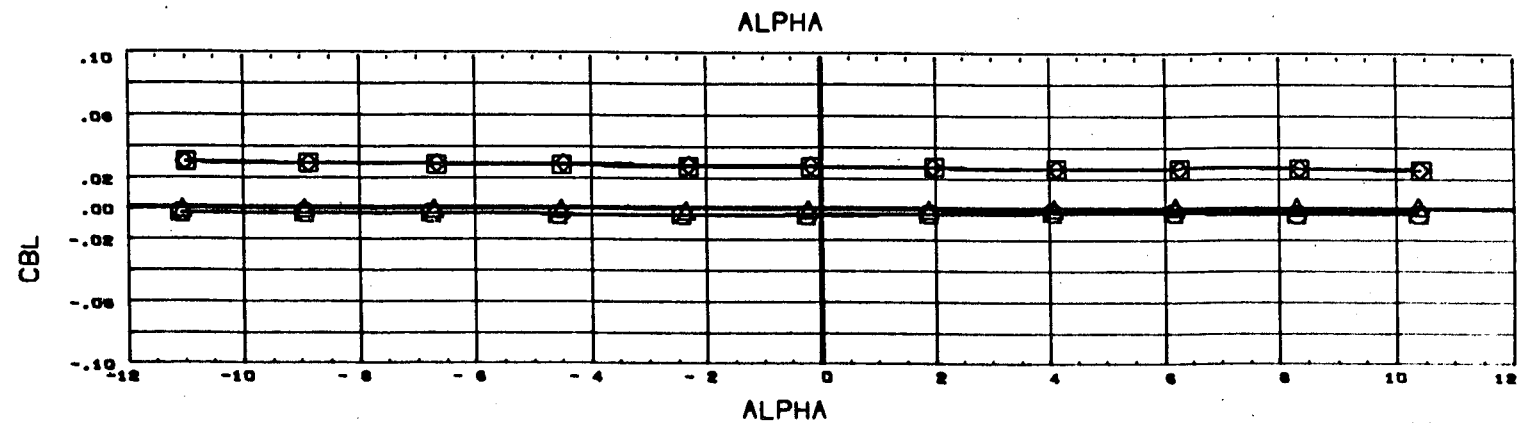
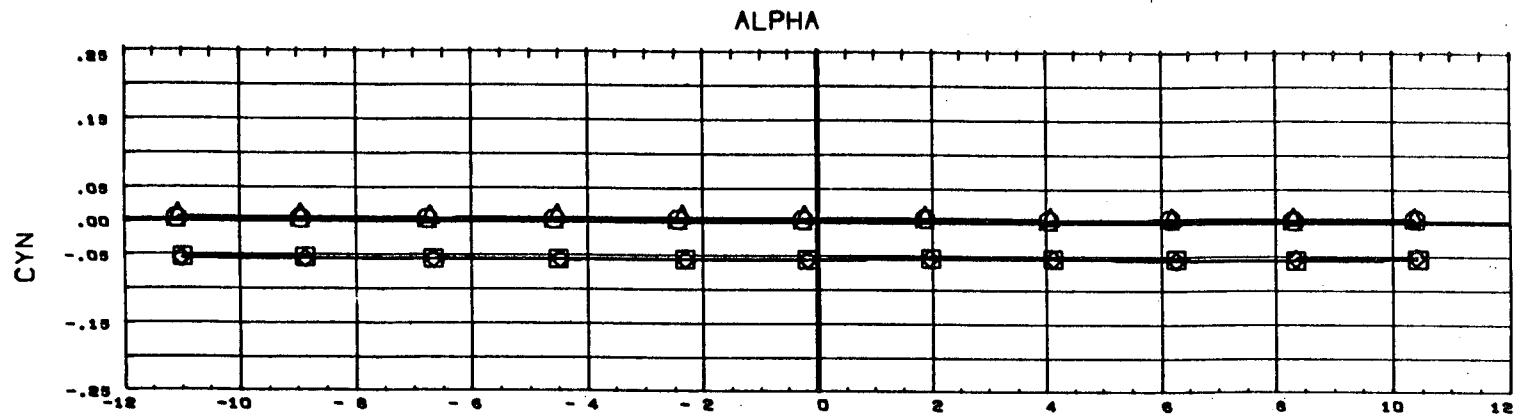
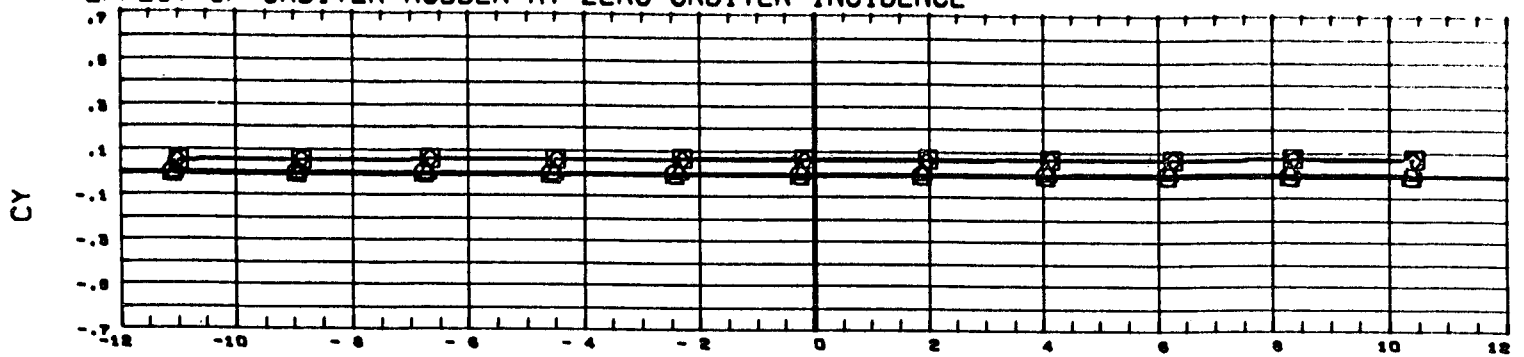
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30. IN. |
| (B71091) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.10

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

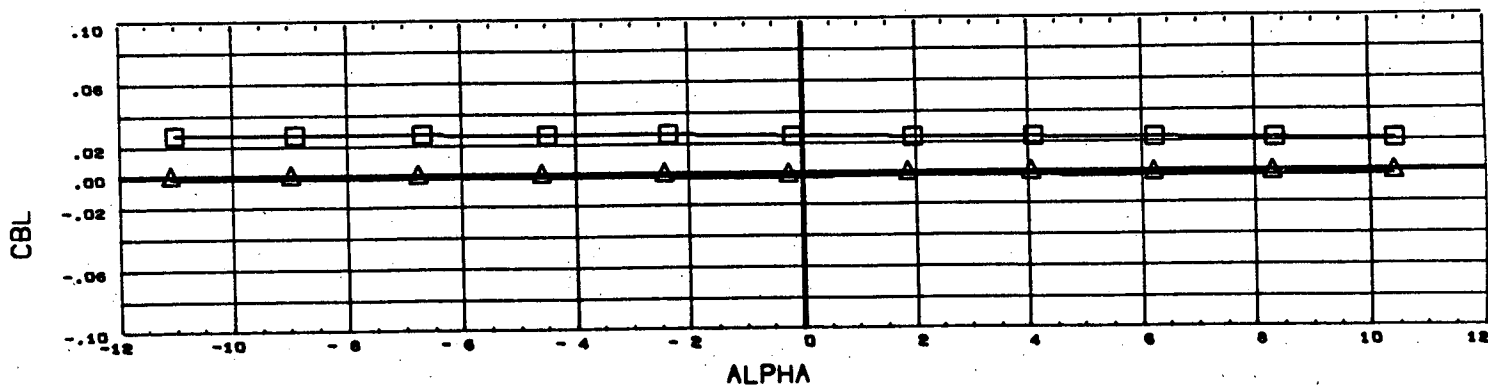
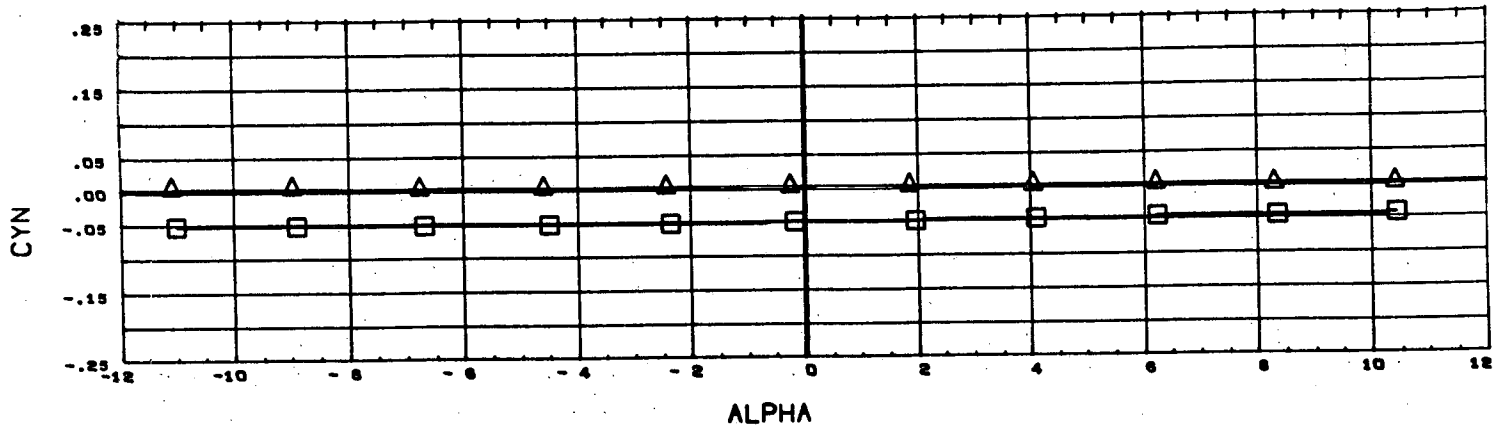
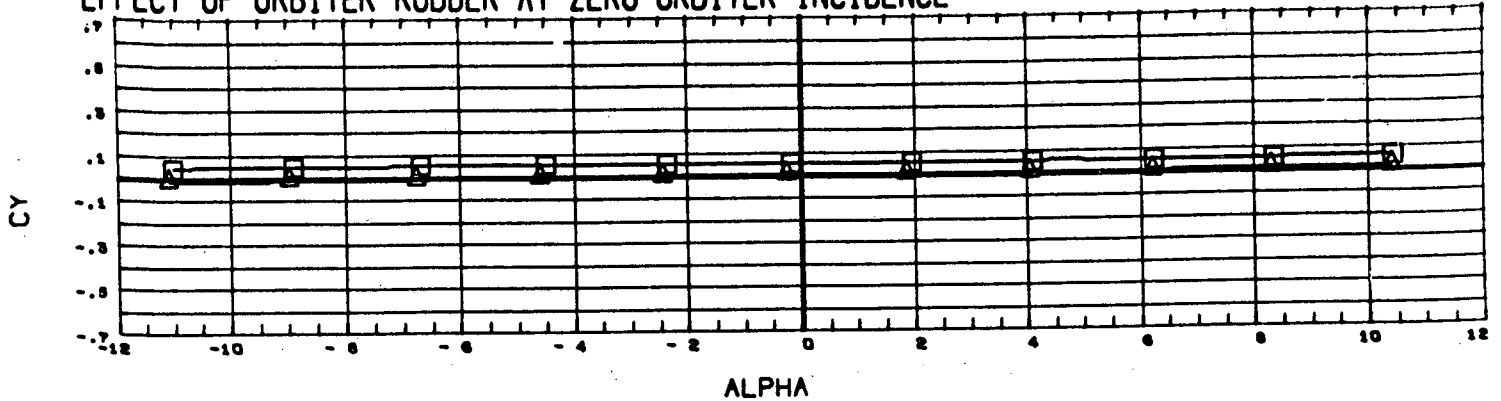


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71095) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

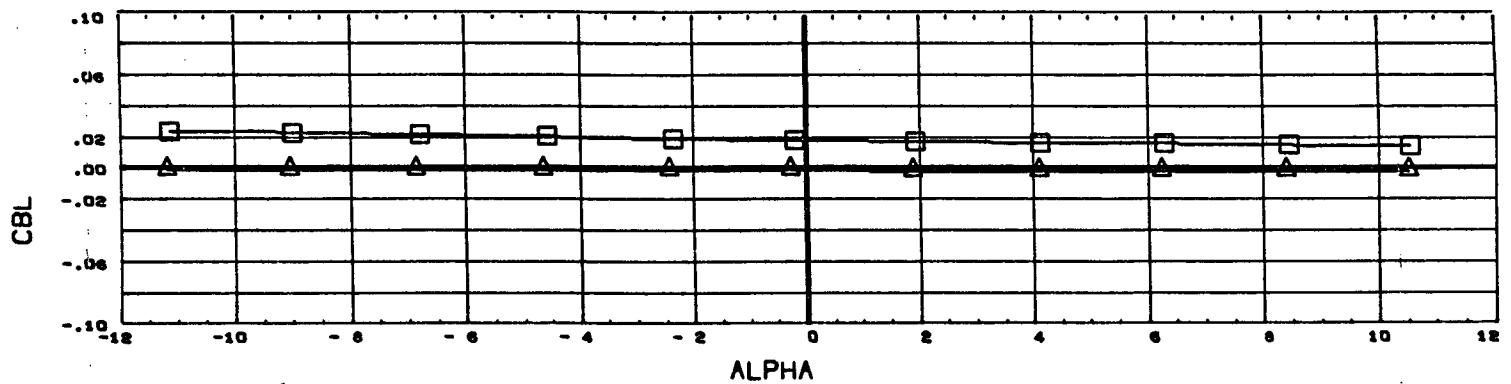
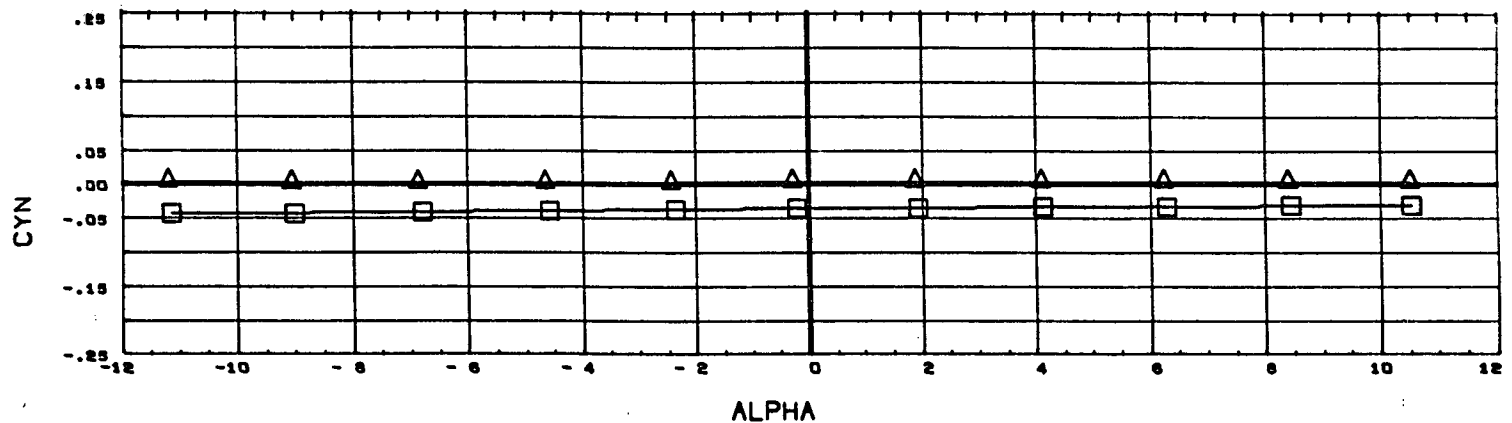
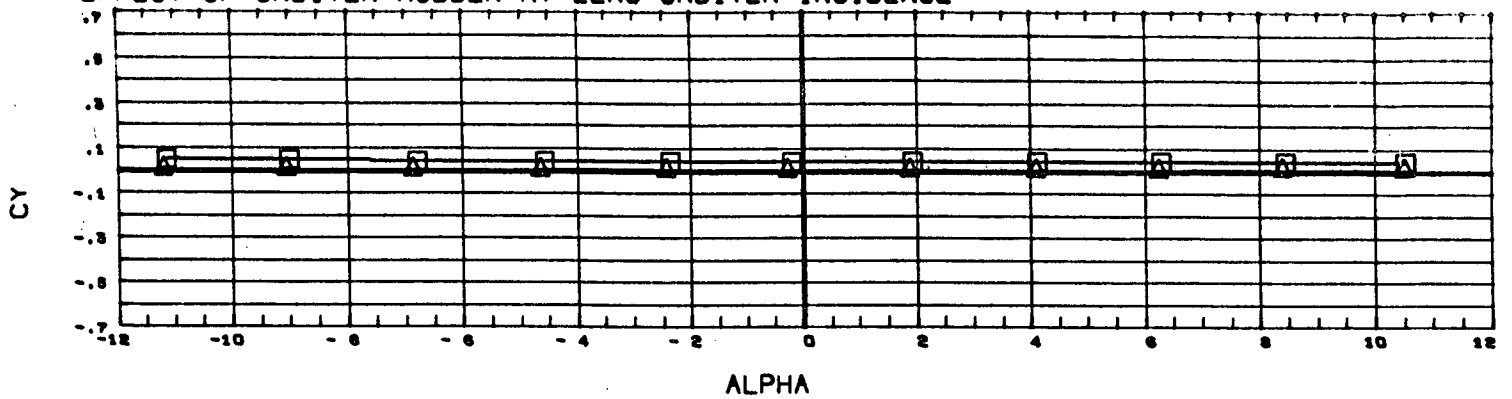


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71093) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

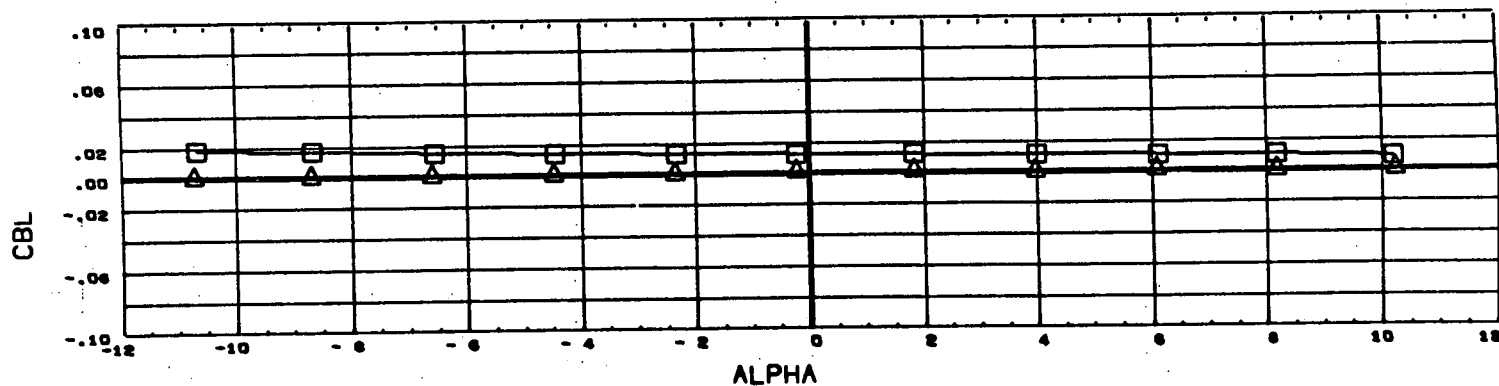
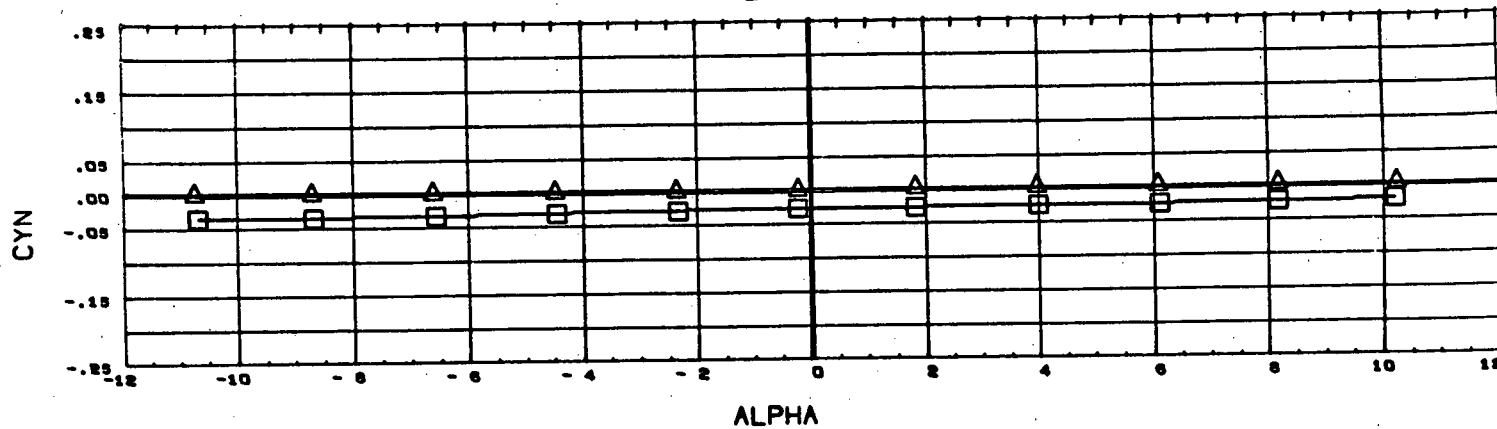
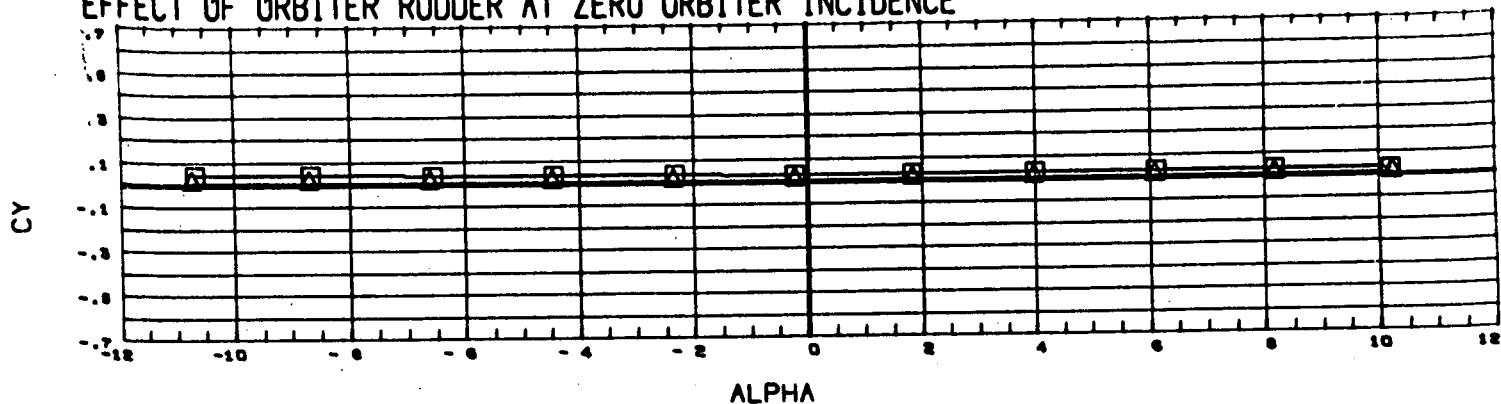


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | 50. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2460 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.95

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

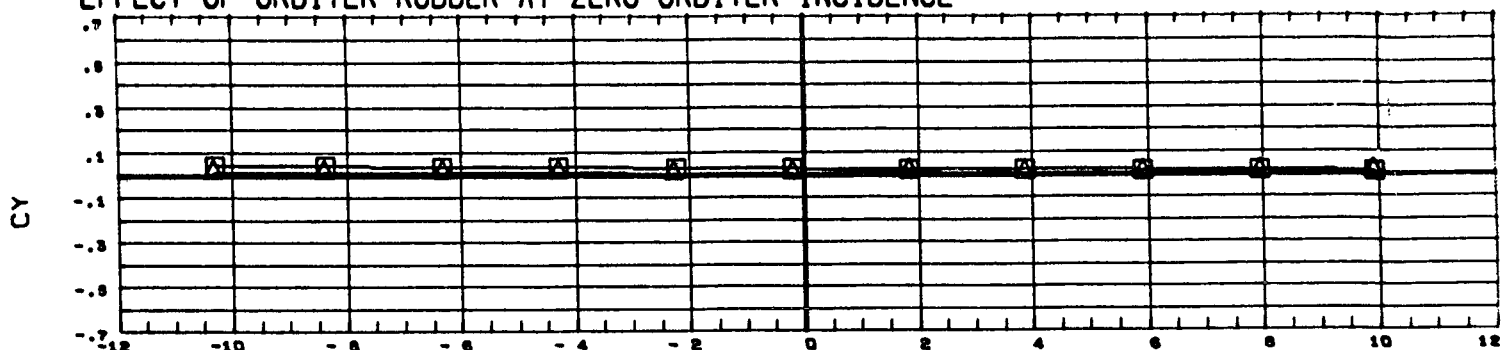


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (B71089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (B71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 30.000 | XNRP | 3.3600 IN. |
| | | | | | | YNRP | 0.0000 IN. |
| | | | | | | ZNRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

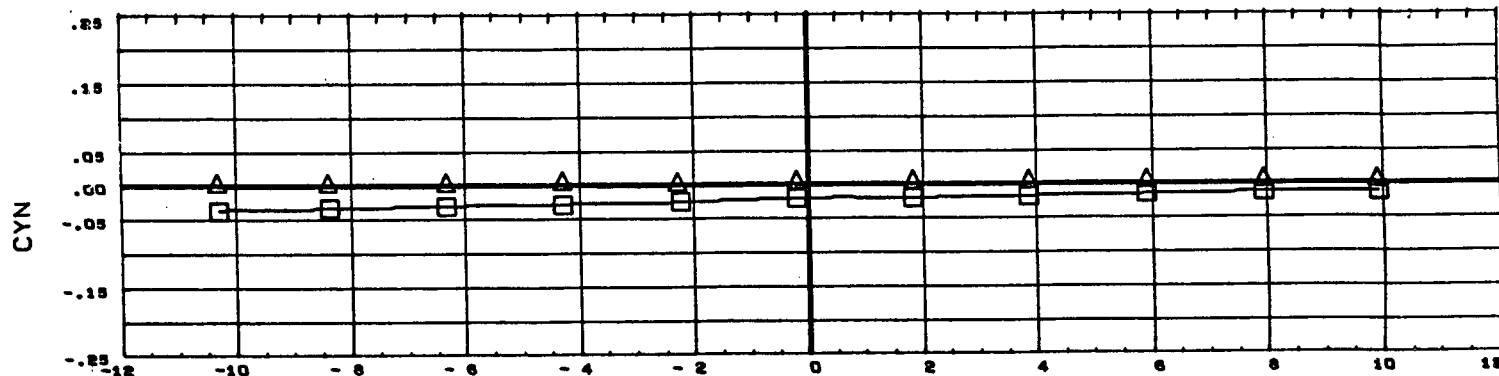
MACH 3.48

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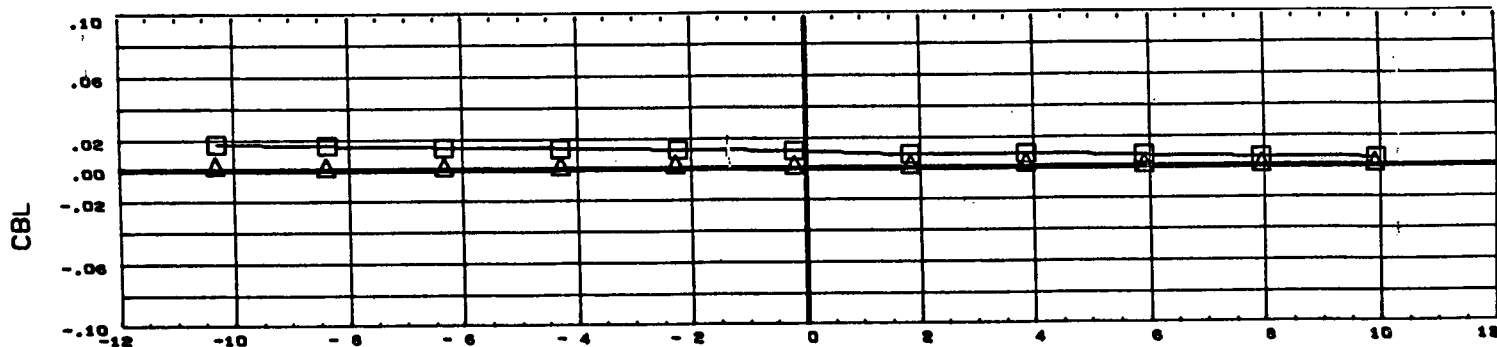
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



ALPHA



ALPHA



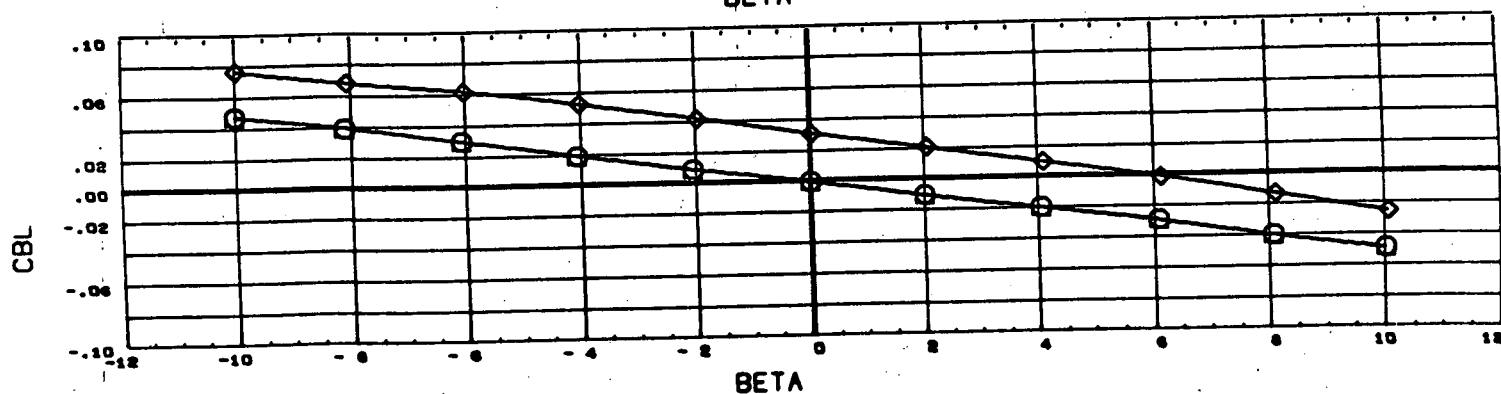
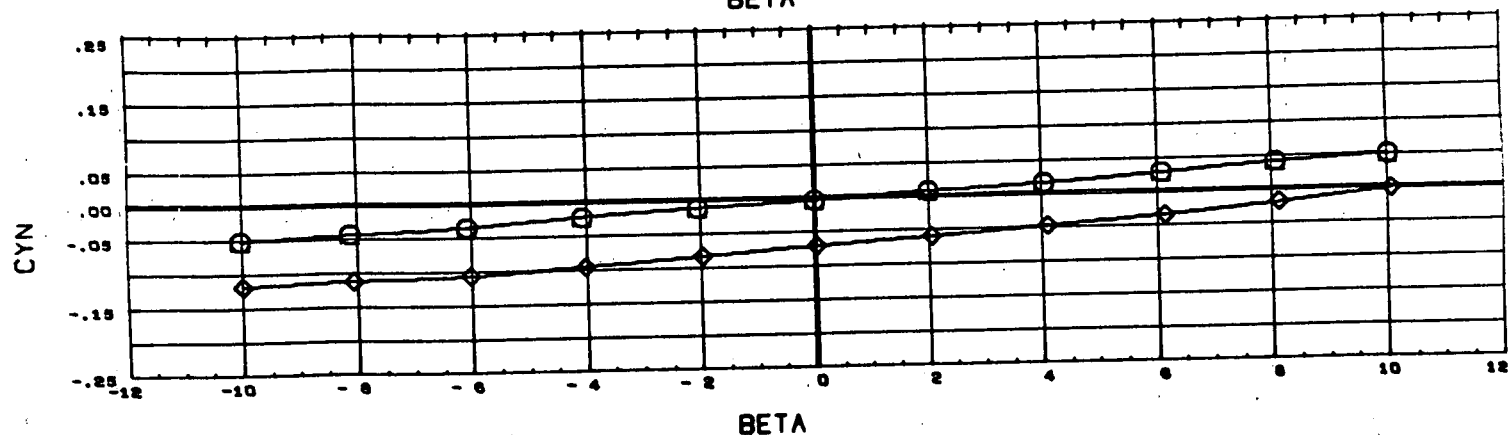
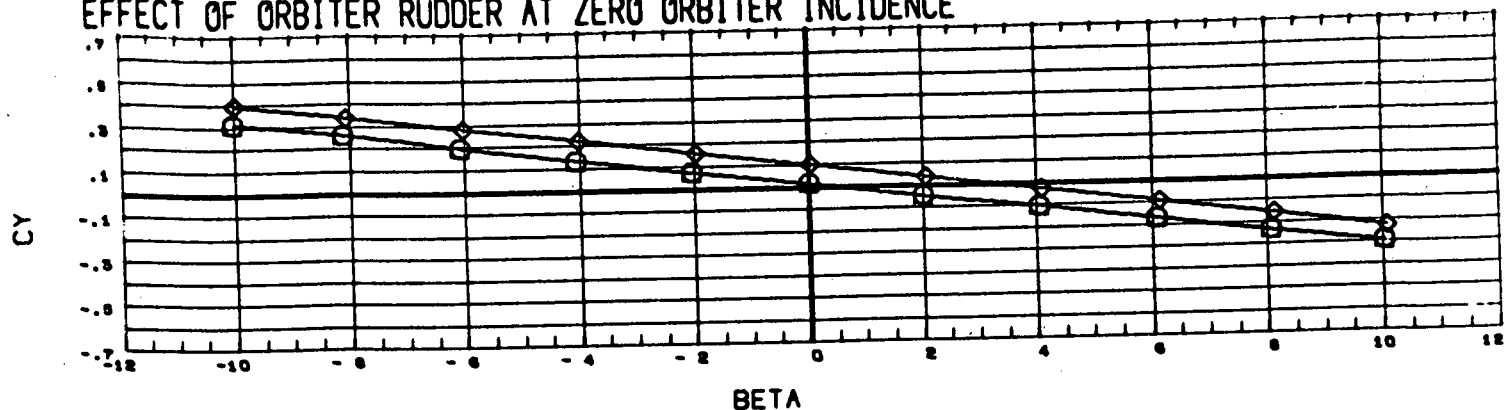
ALPHA

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (871089) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871093) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRR | 3.3600 IN. |
| | | | | | | YMRR | 0.0000 IN. |
| | | | | | | ZMRR | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

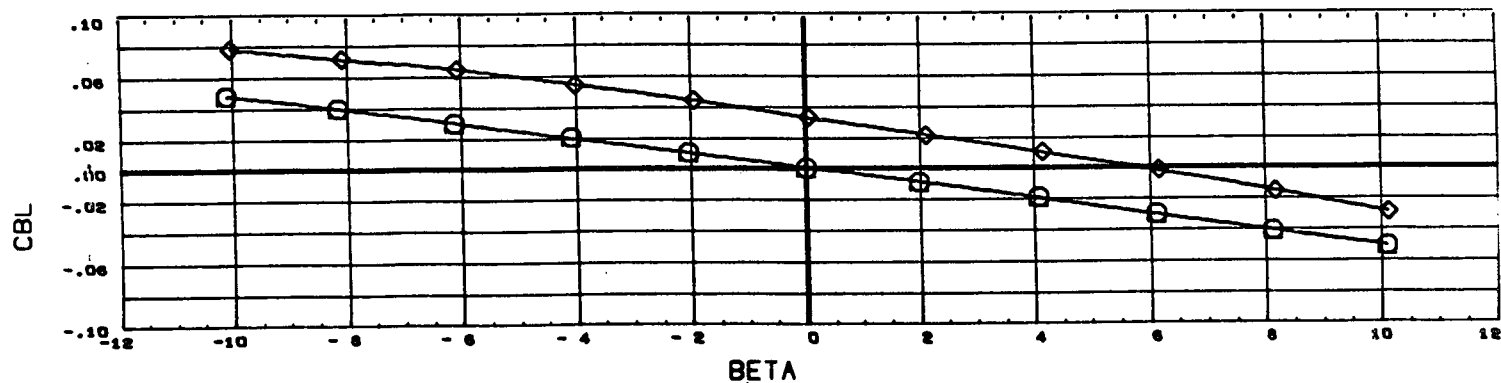
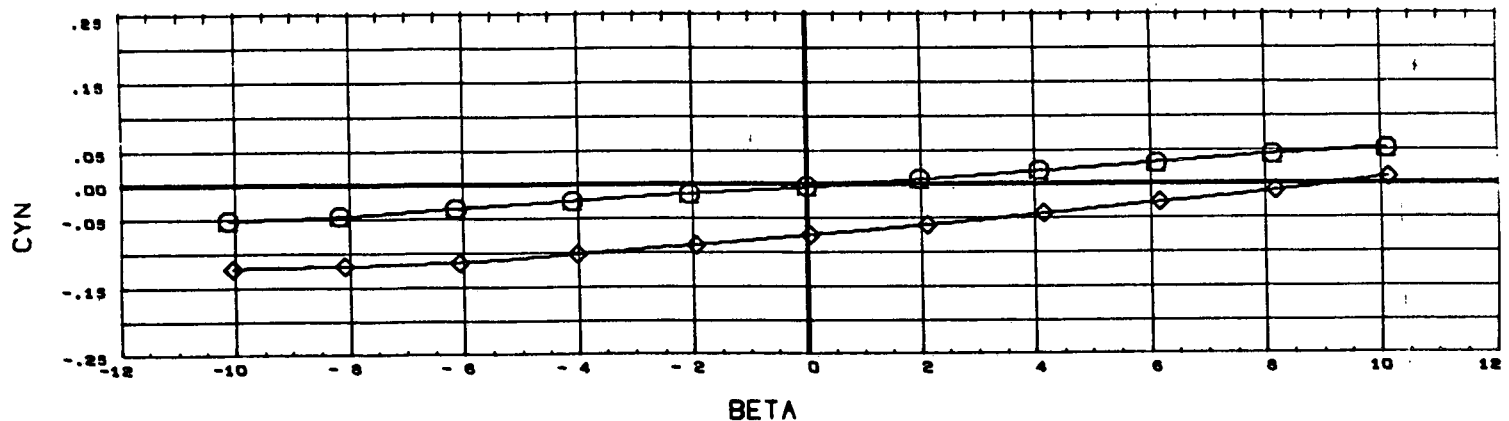
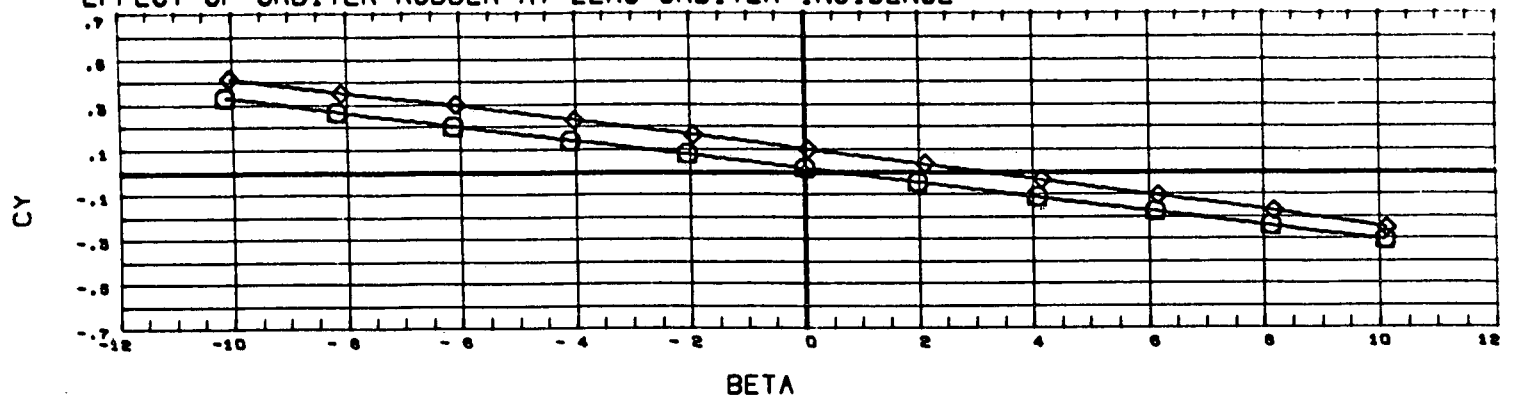


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | Y3 | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---|---------|-------|--------|--------|-----------------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 30.000 | BREF 4.4600 IN. |
| (A71094) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP 3.3600 IN. |
| | | | | | | YMRP 0.0000 IN. |
| | | | | | | ZMRP 0.2460 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH

.60

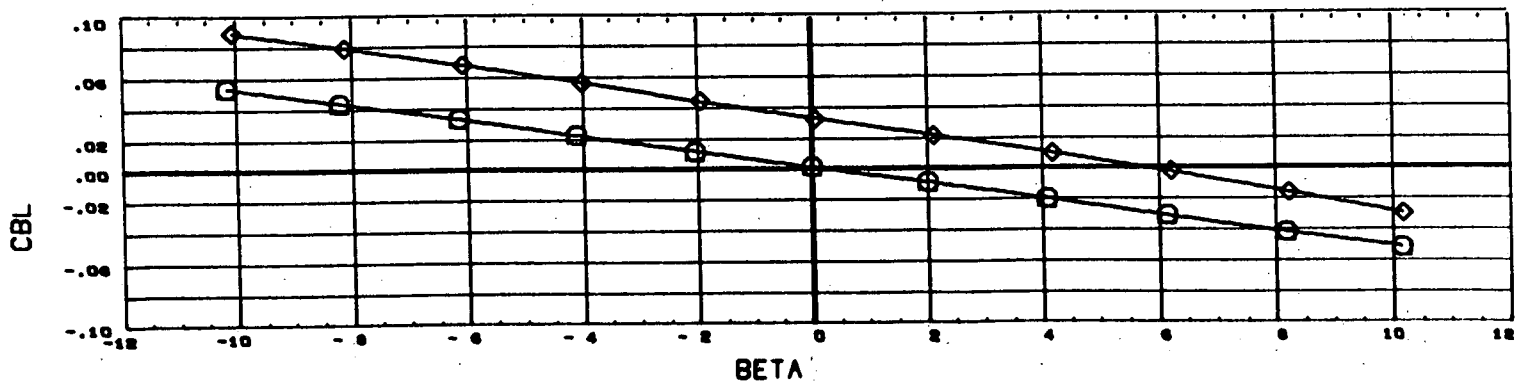
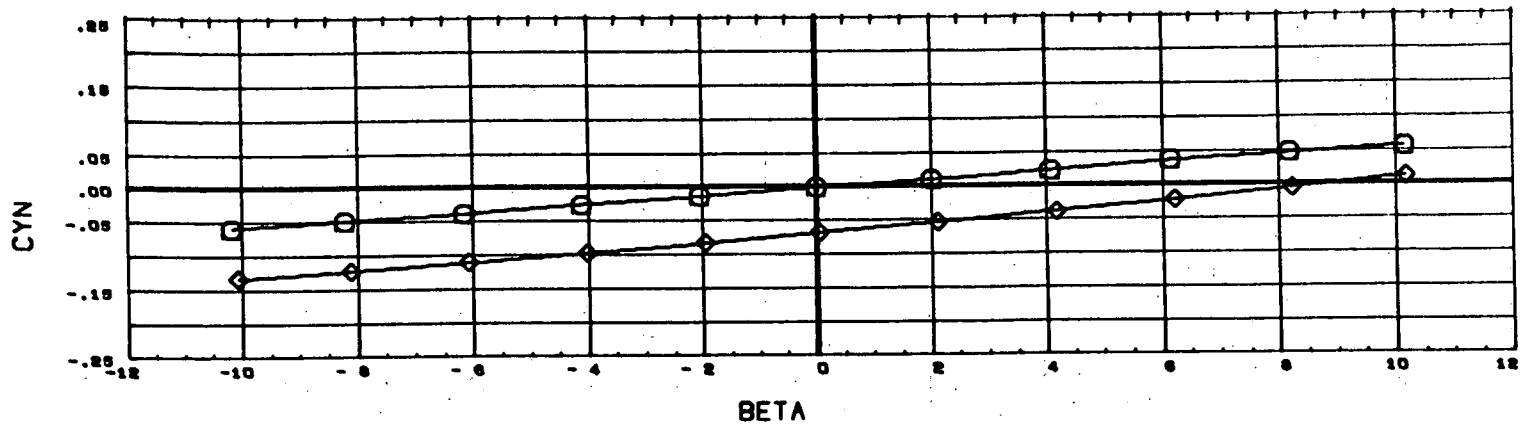
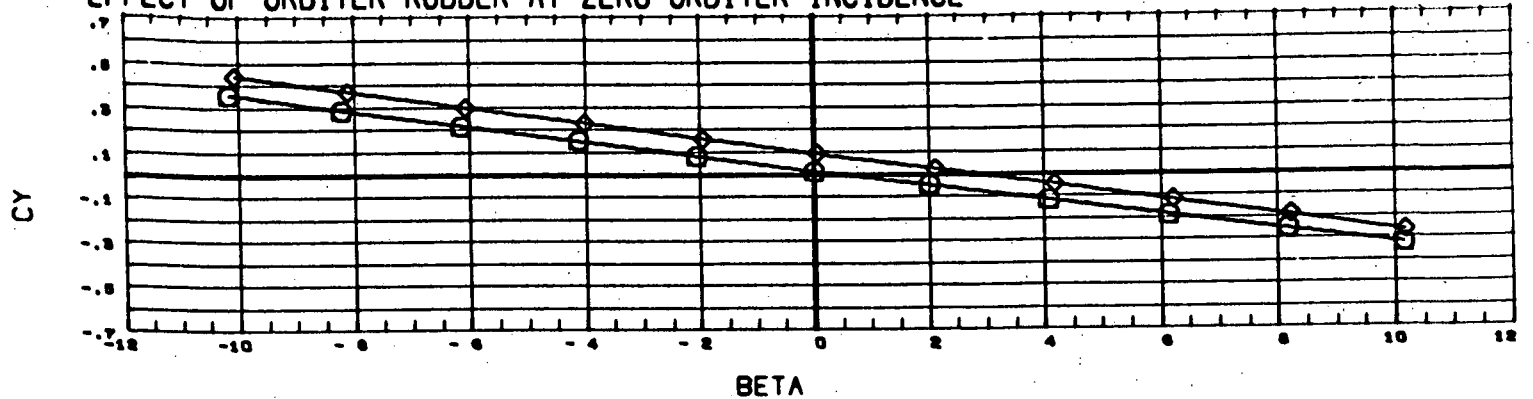
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (A71094) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .80

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



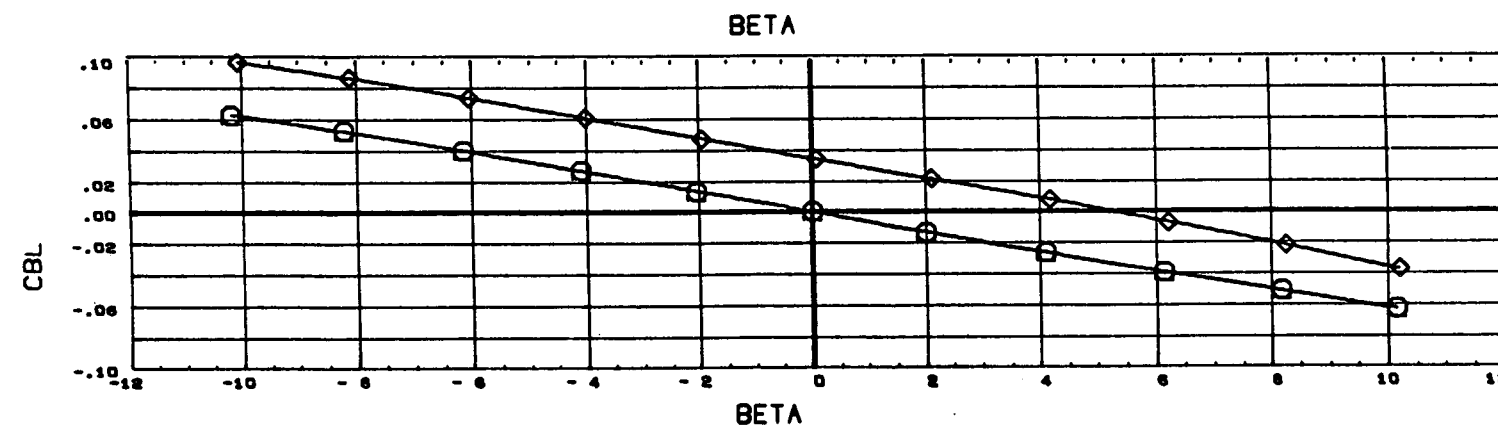
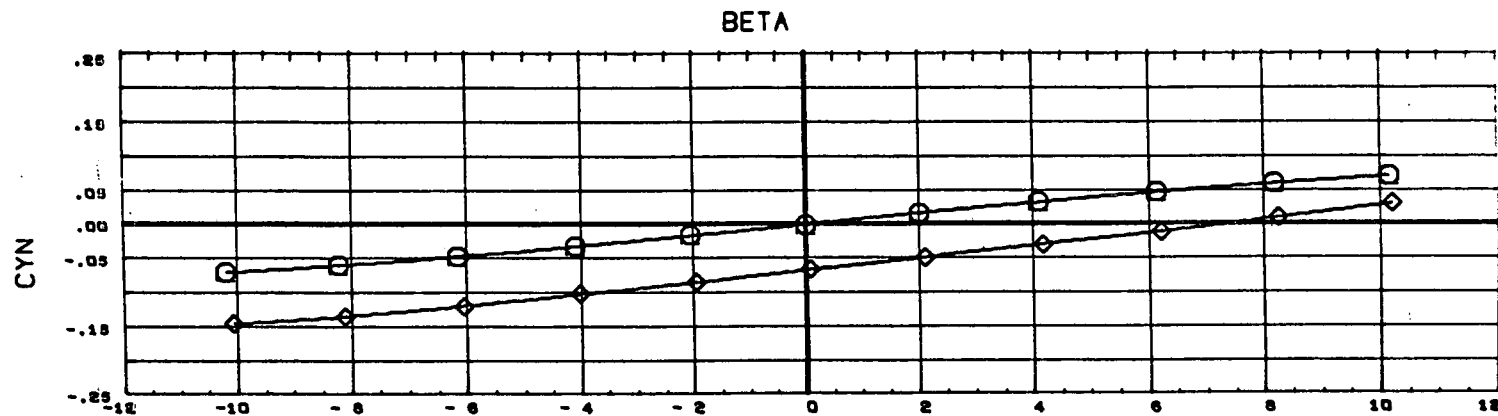
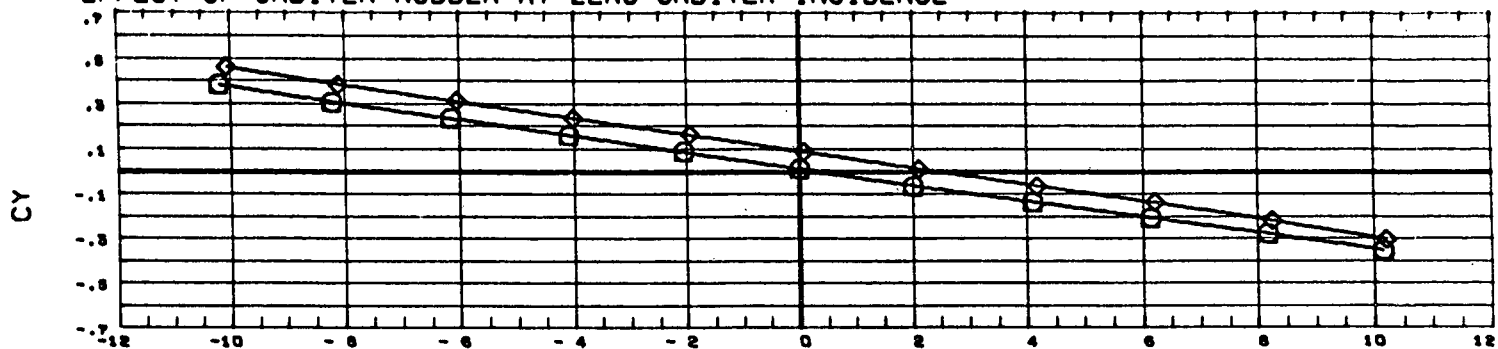
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30151 |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30151 |
| (A71094) | DATA NOT AVAILABLE FOR ALL CONDITIONS |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|--------|-------|--------|--------|-----------------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREP 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREP 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREP 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP 3.3600 IN. |
| | | | | YMRP 0.0000 IN. |
| | | | | ZMRP 0.2480 IN. |
| | | | | SCALE 0.0040 SCALE |

MACH .90

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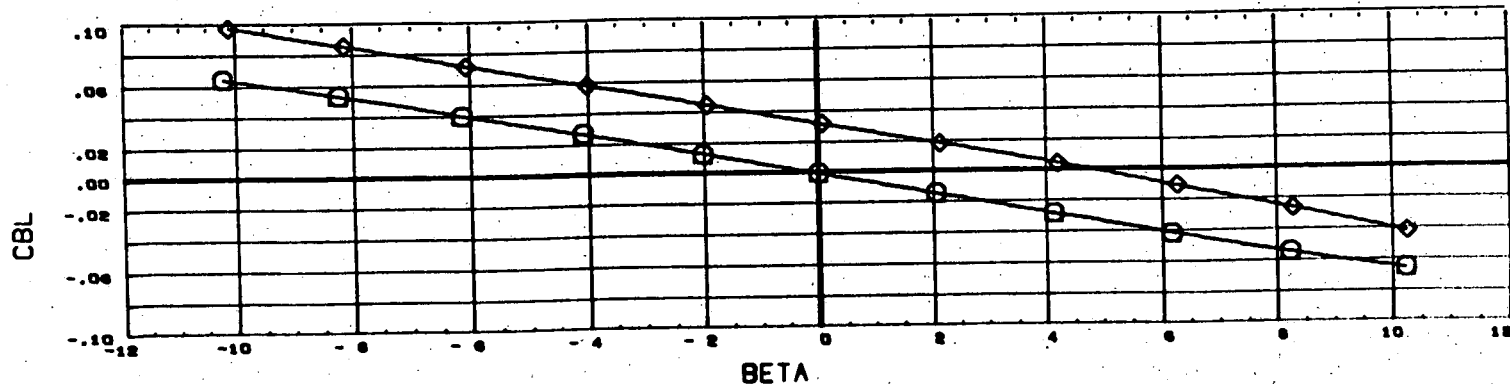
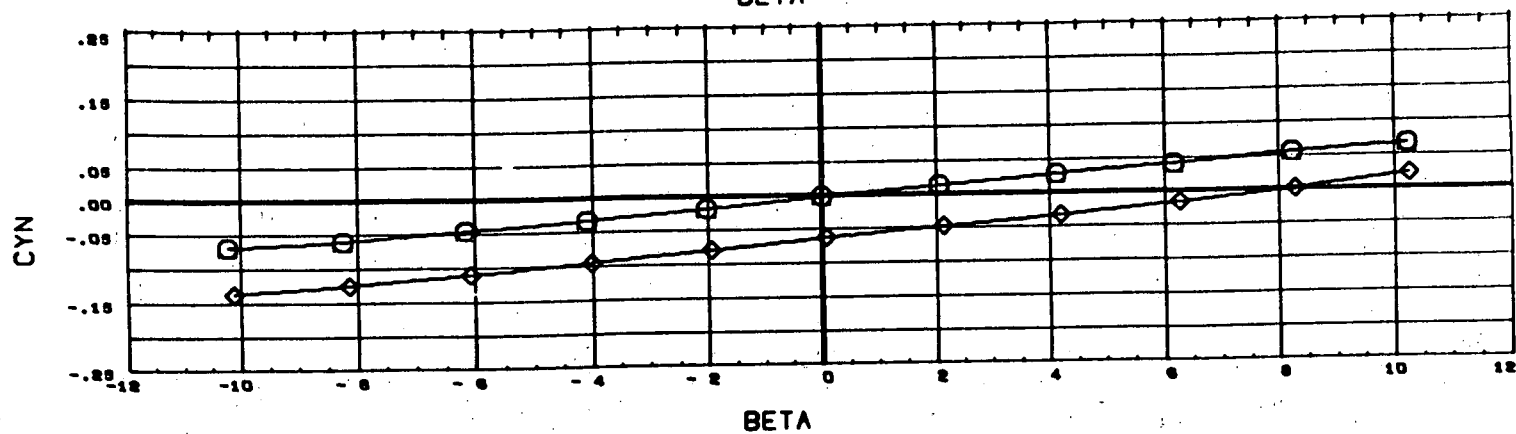
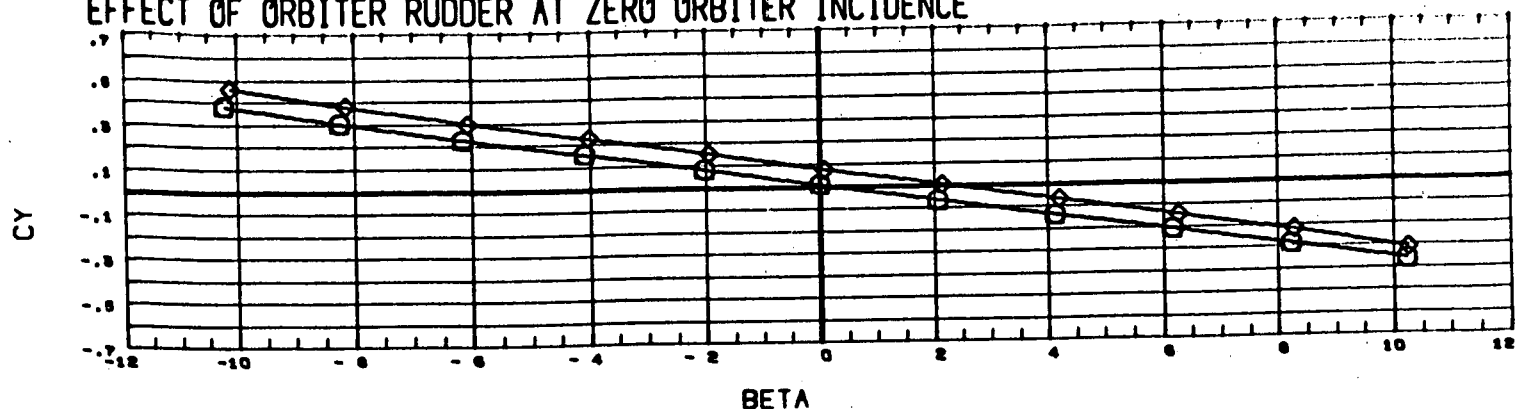
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (A71094) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.00

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



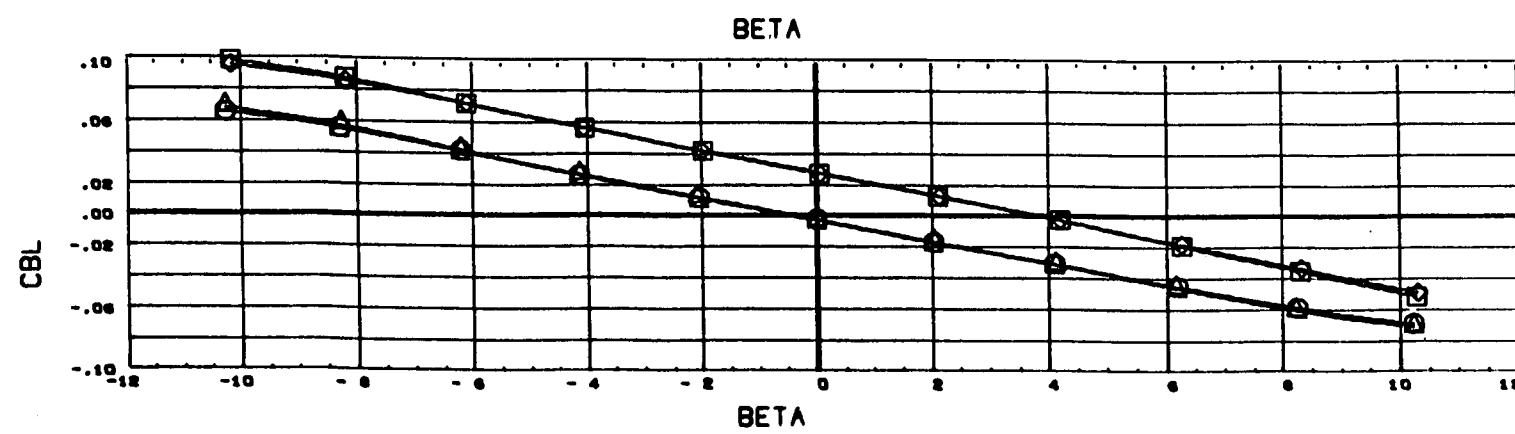
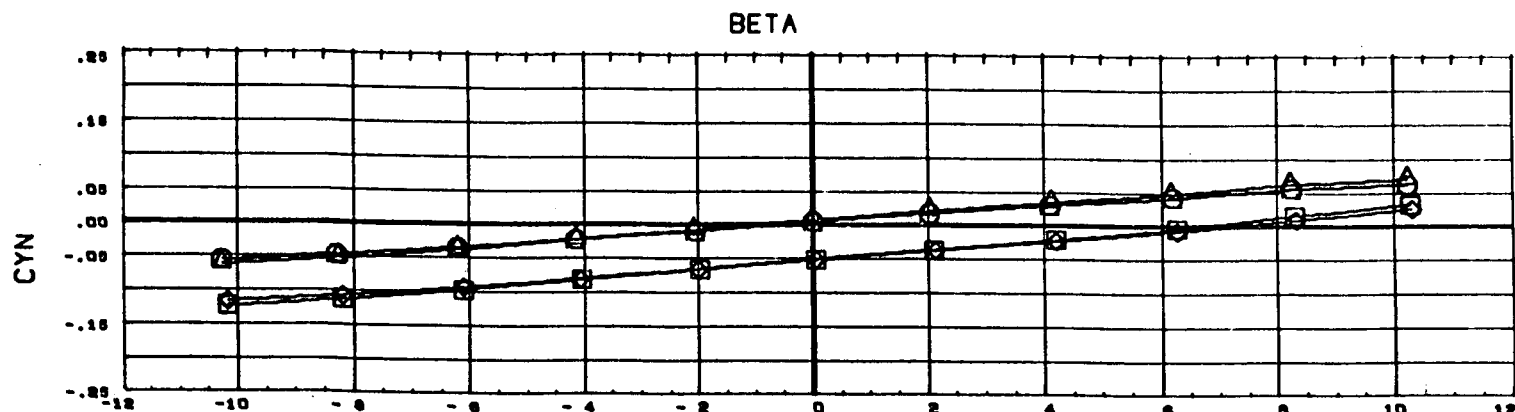
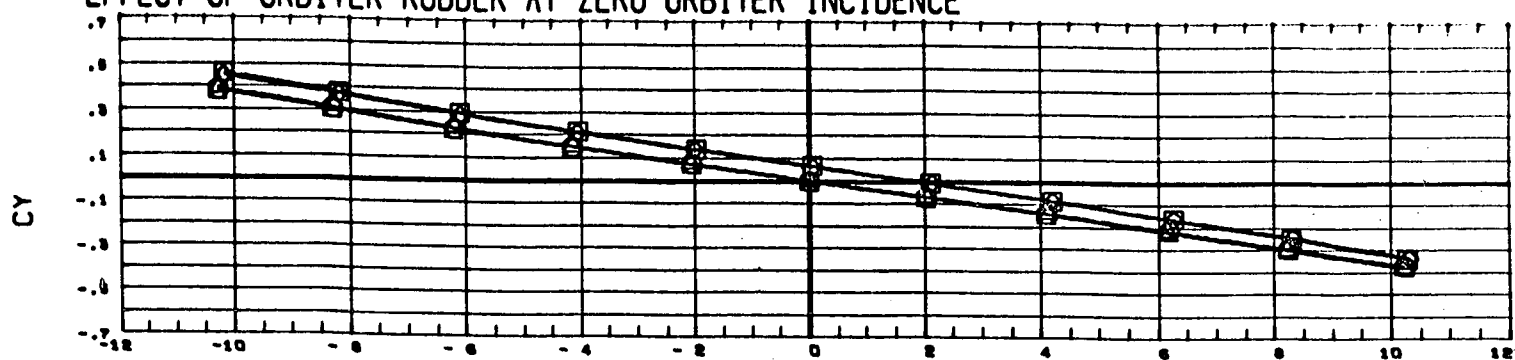
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 |
| (A71092) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 |
| (A71094) | DATA NOT AVAILABLE FOR ALL CONDITIONS |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|--------|-------|--------|--------|-----------------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.6600 SQ.IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRF 3.3600 IN. |
| | | | | YMRF 0.0000 IN. |
| | | | | ZMRF 0.2480 IN. |
| | | | | SCALE 0.0040 SCALE |

MACH 1.10

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

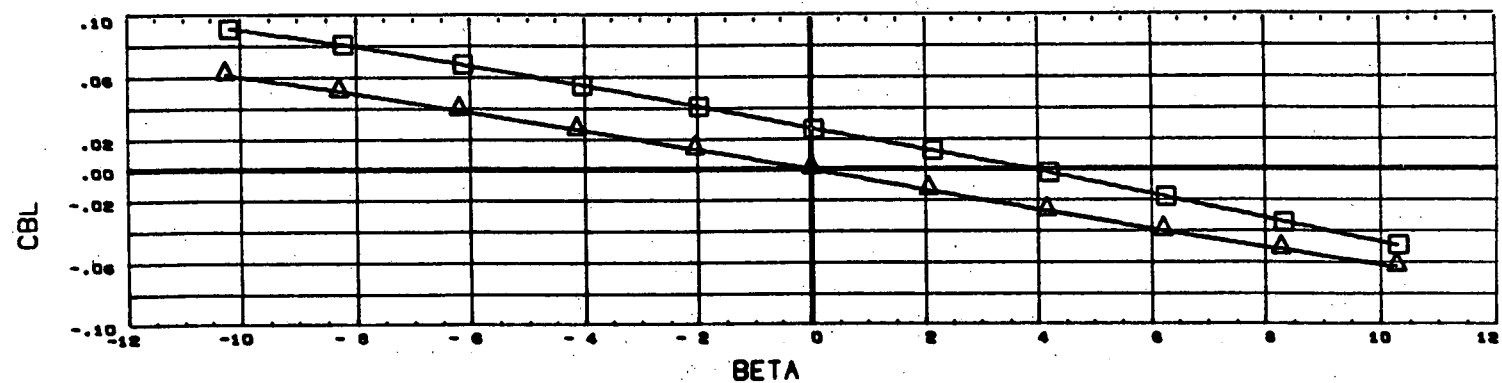
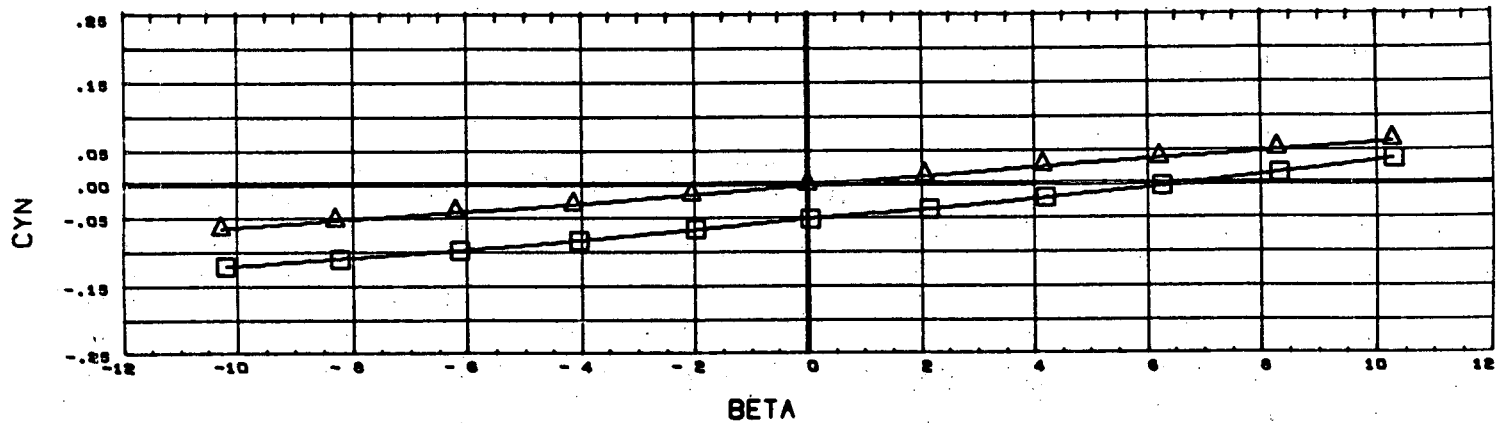
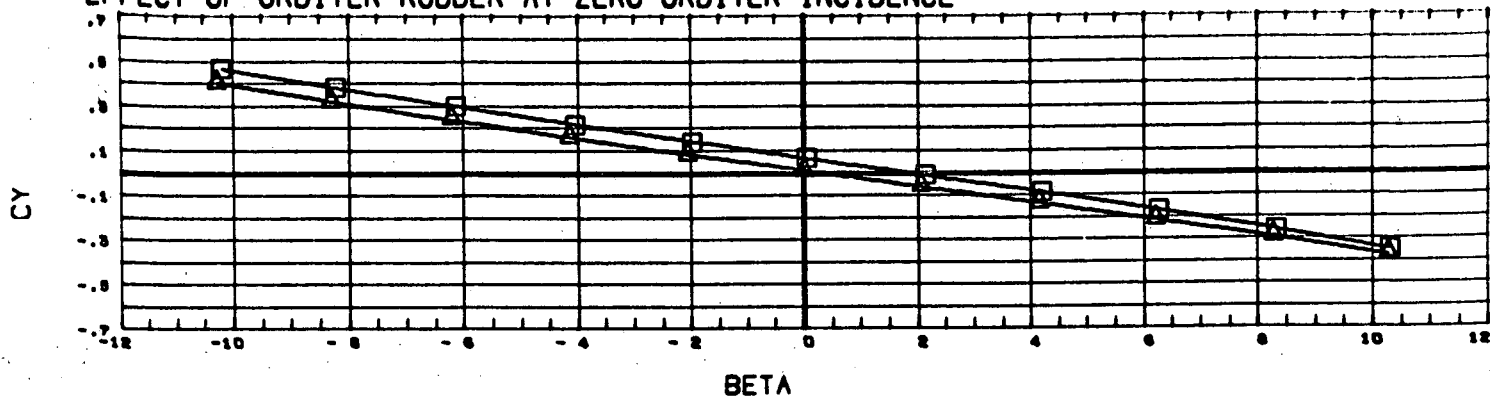


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LRFP | 2.0260 IN. |
| (A71096) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 30.000 | BRFP | 4.4600 IN. |
| (A71094) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

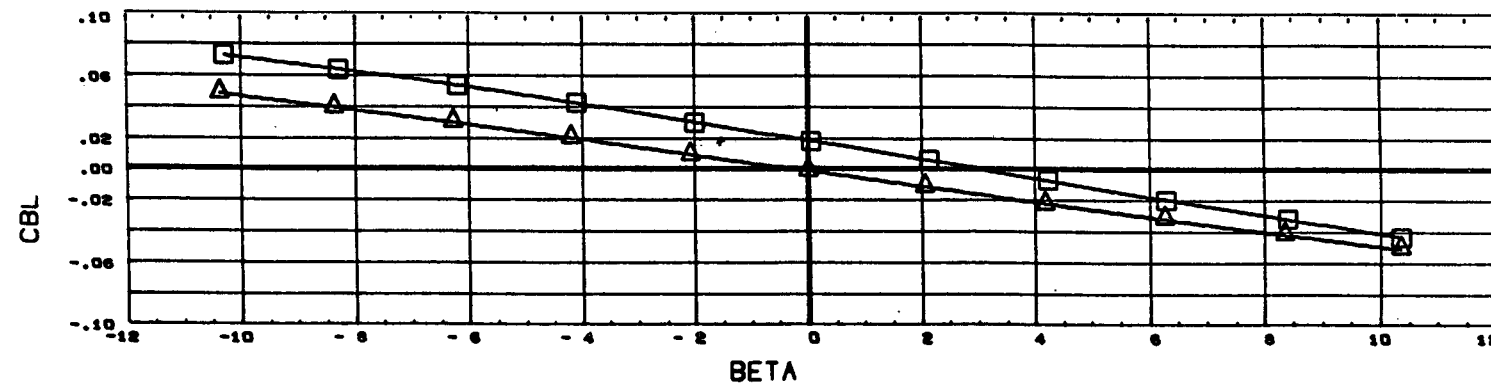
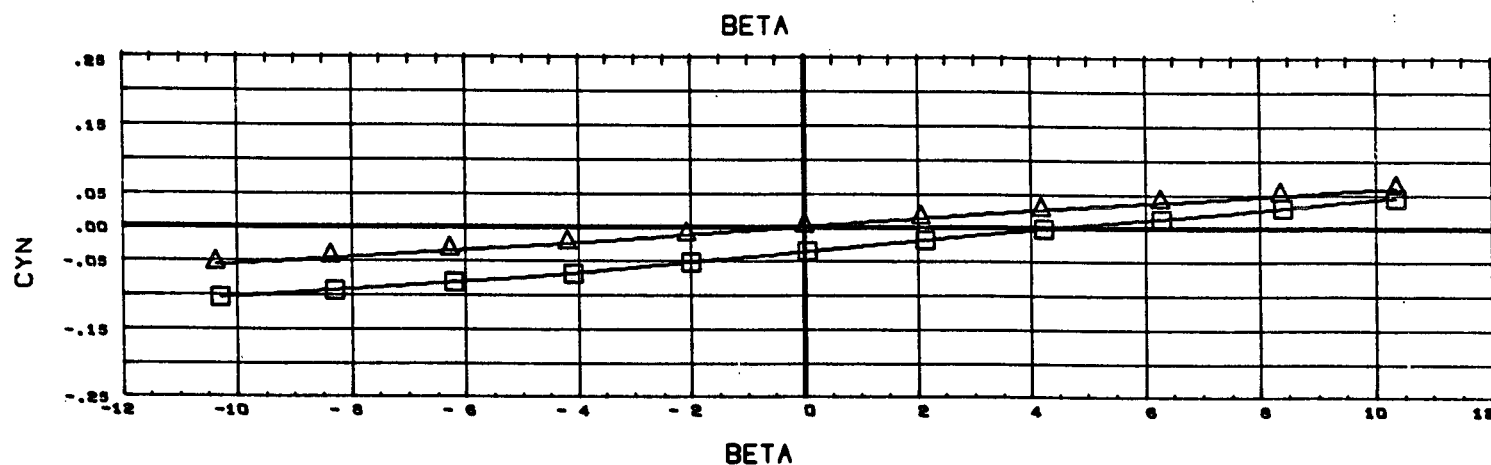
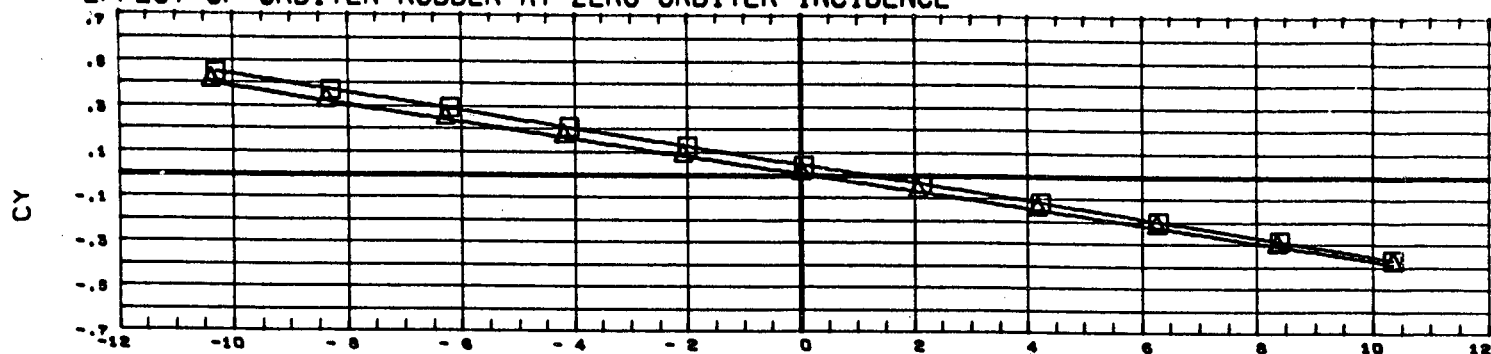


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 84. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71096) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (A71094) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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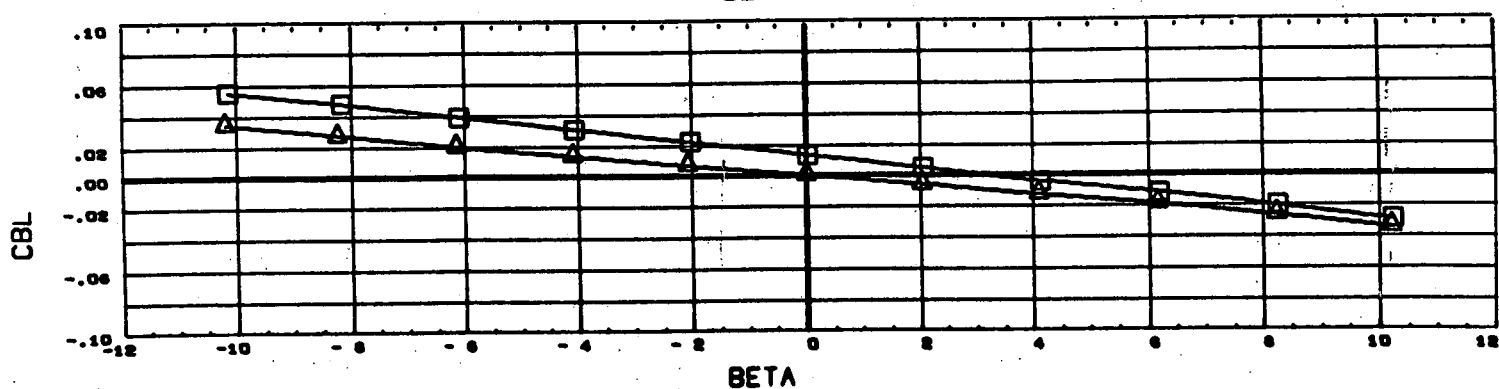
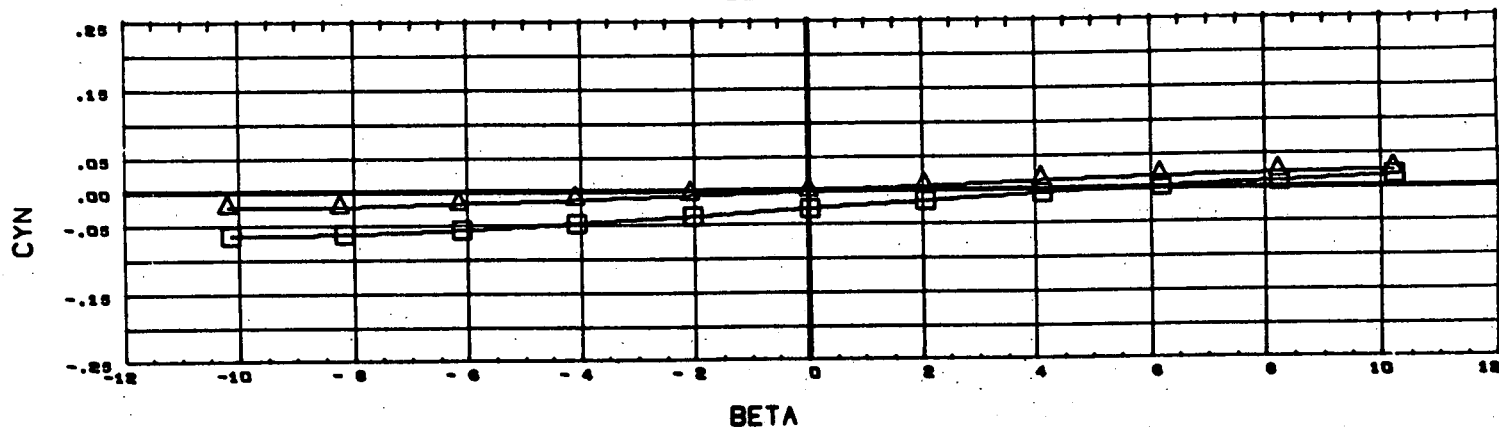
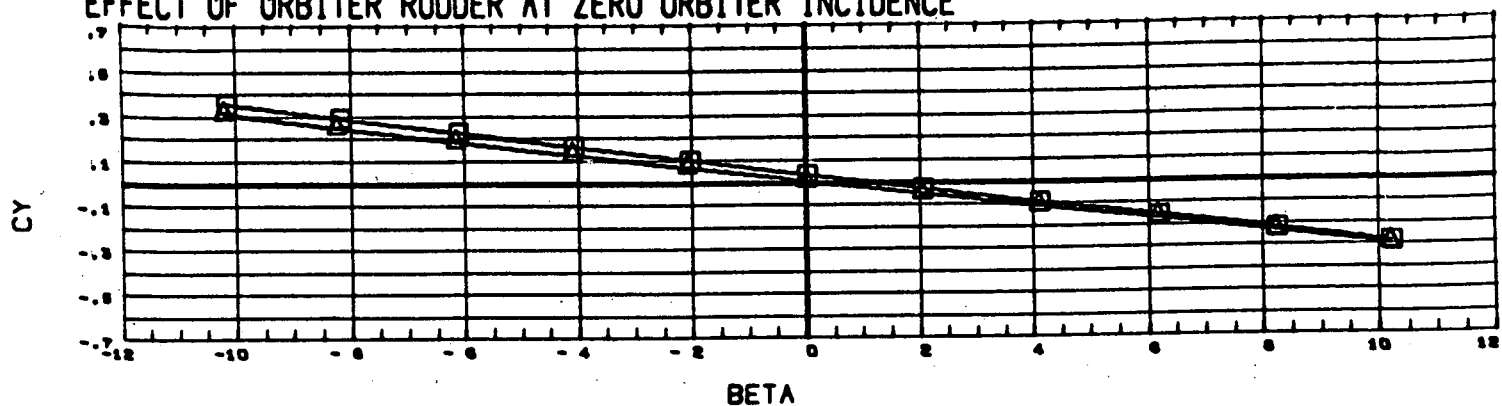
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBSINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71096) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (A71094) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

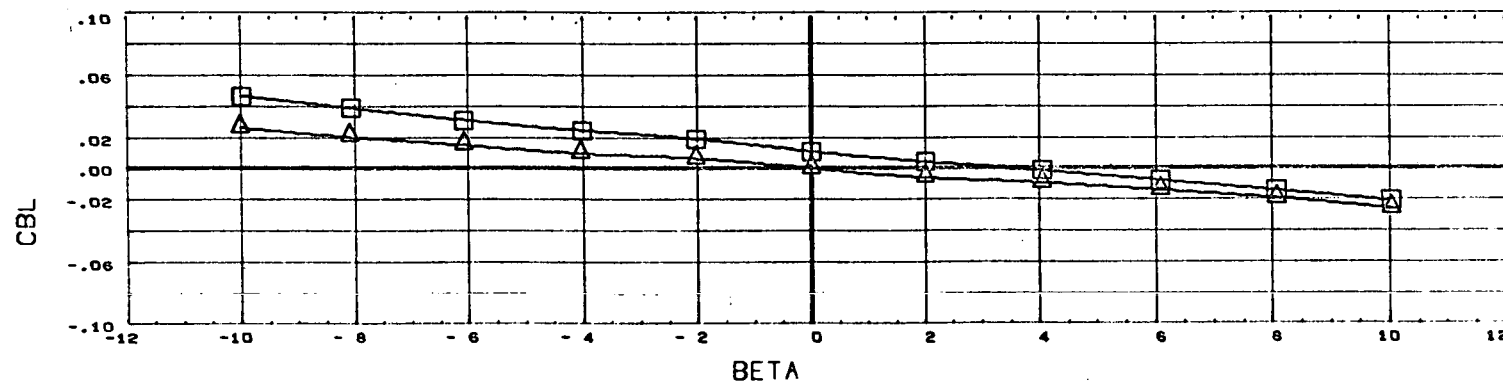
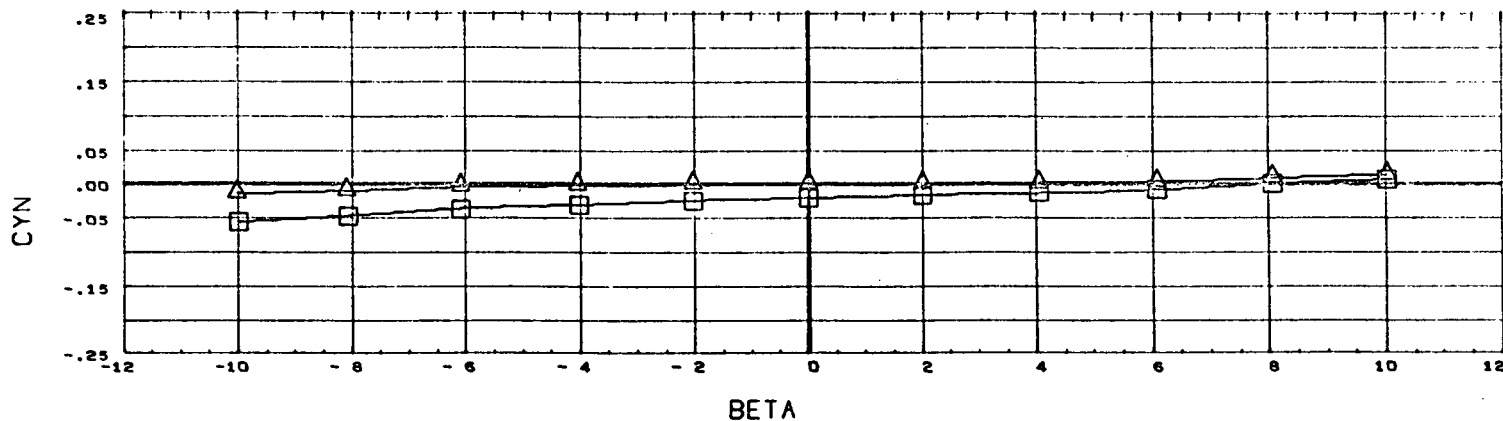
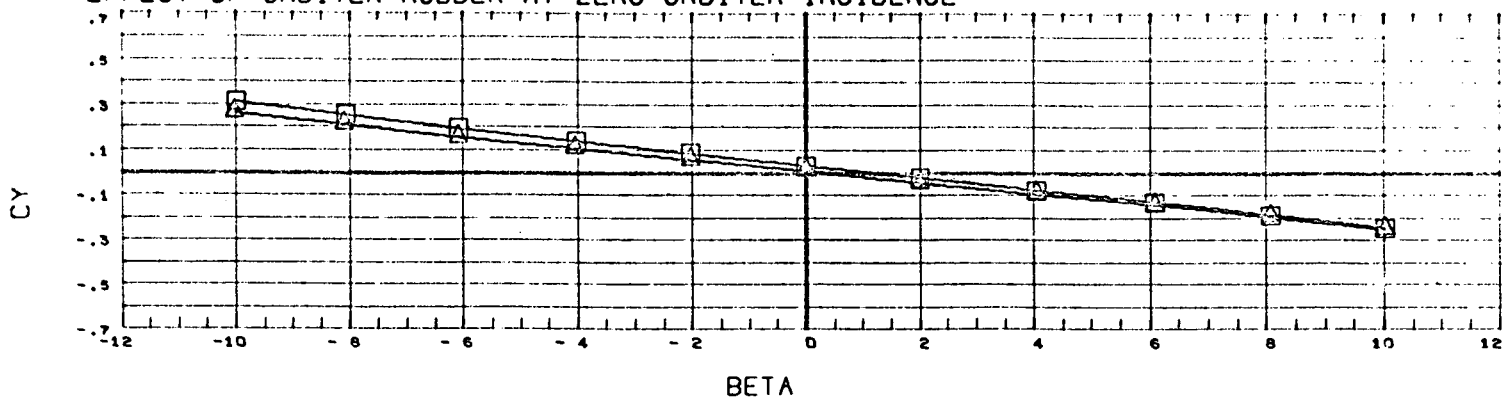
EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | Y8 | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (A71090) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 0.000 | SREP | 7.8800 80.IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.025 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (A71096) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 30.000 | BREP | 4.4600 IN. |
| (A71094) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30251 | 0.000 | 0.025 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.8480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

EFFECT OF ORBITER RUDDER AT ZERO ORBITER INCIDENCE

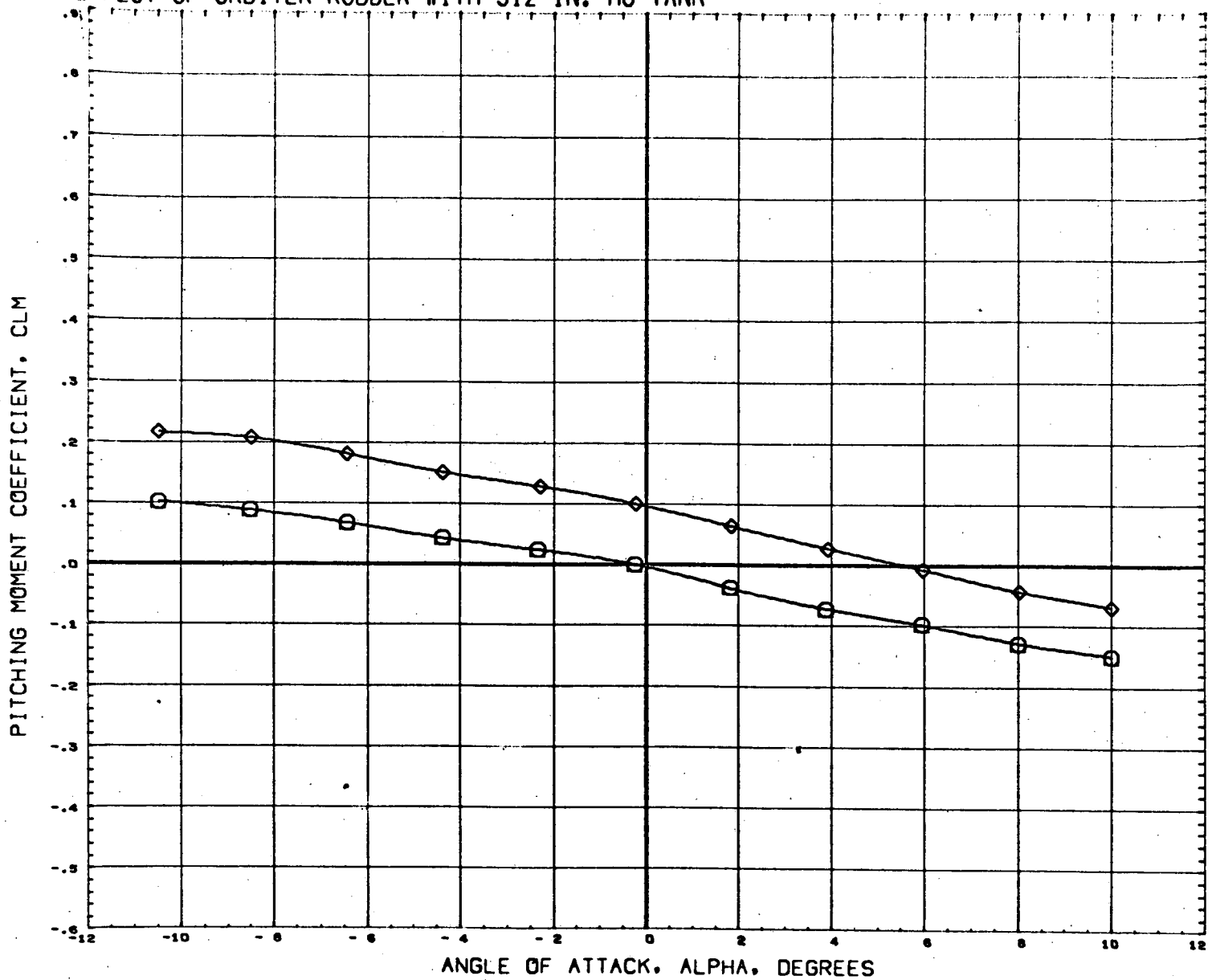


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (A71095) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (A71096) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (A71094) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 4.96

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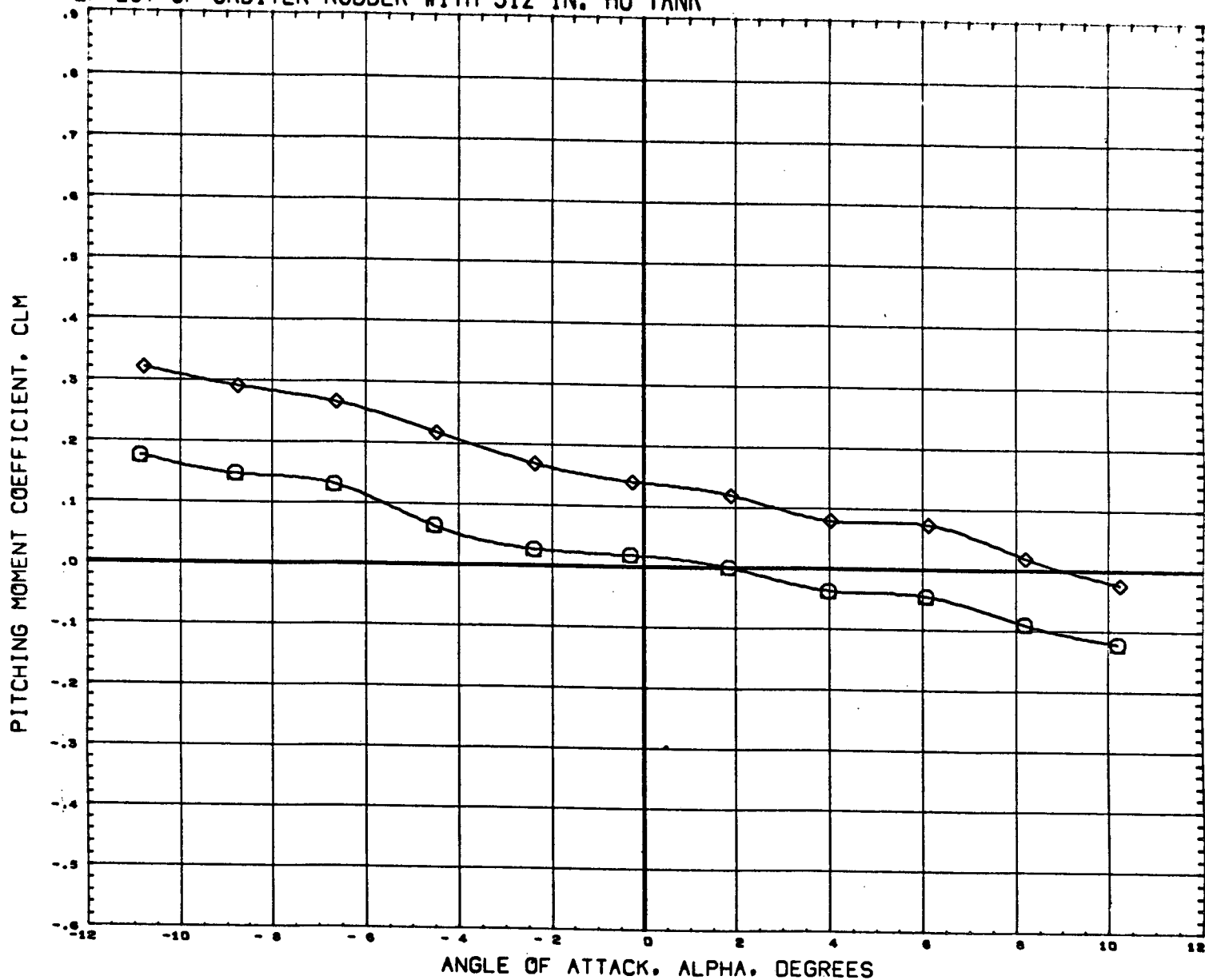
EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

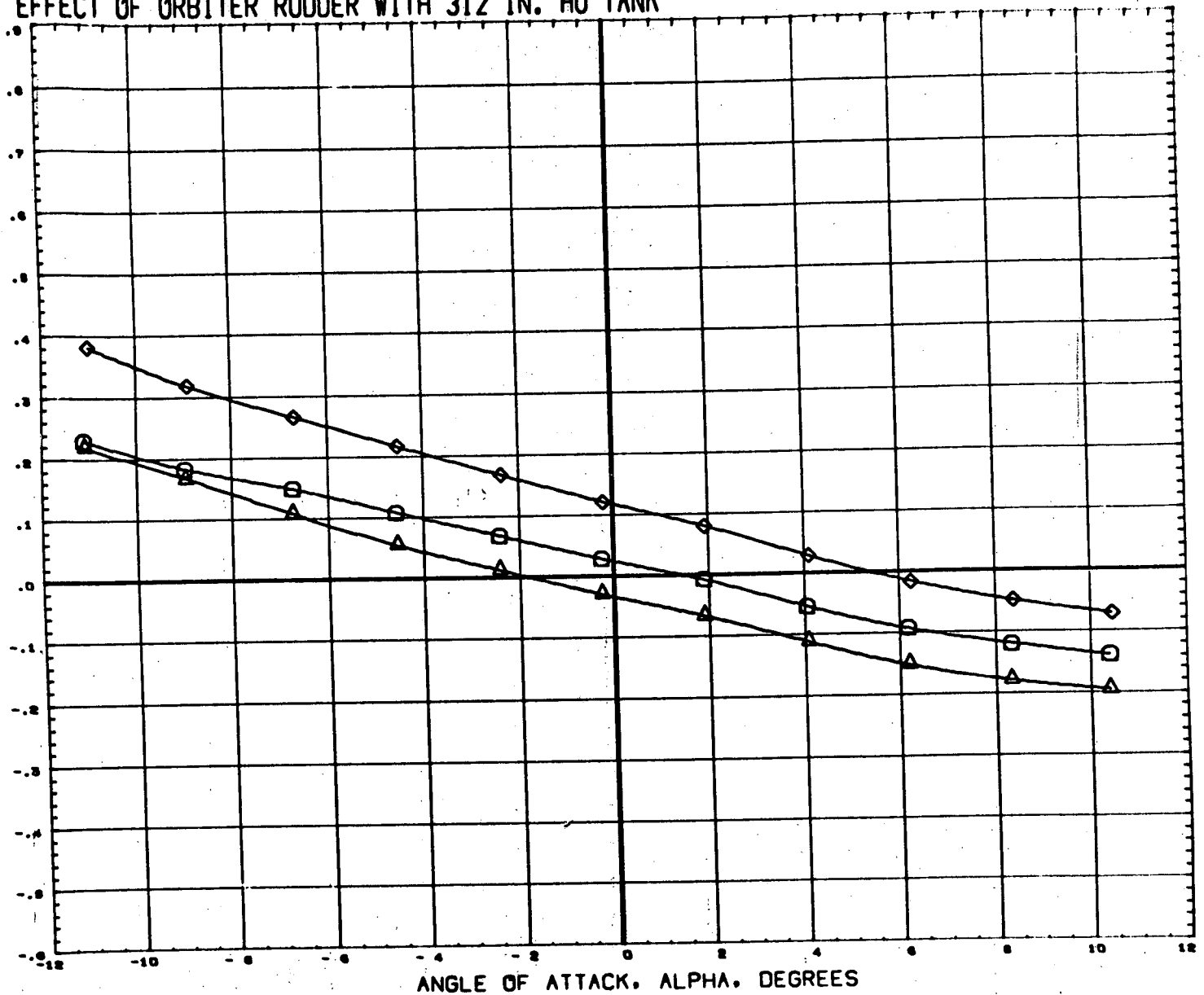


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 30. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

PITCHING MOMENT COEFFICIENT, CLM



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | |
|-----------------|---|--|
| (B71135) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | |
| (B71133) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | |
| (B71137) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | |
| (B71139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |

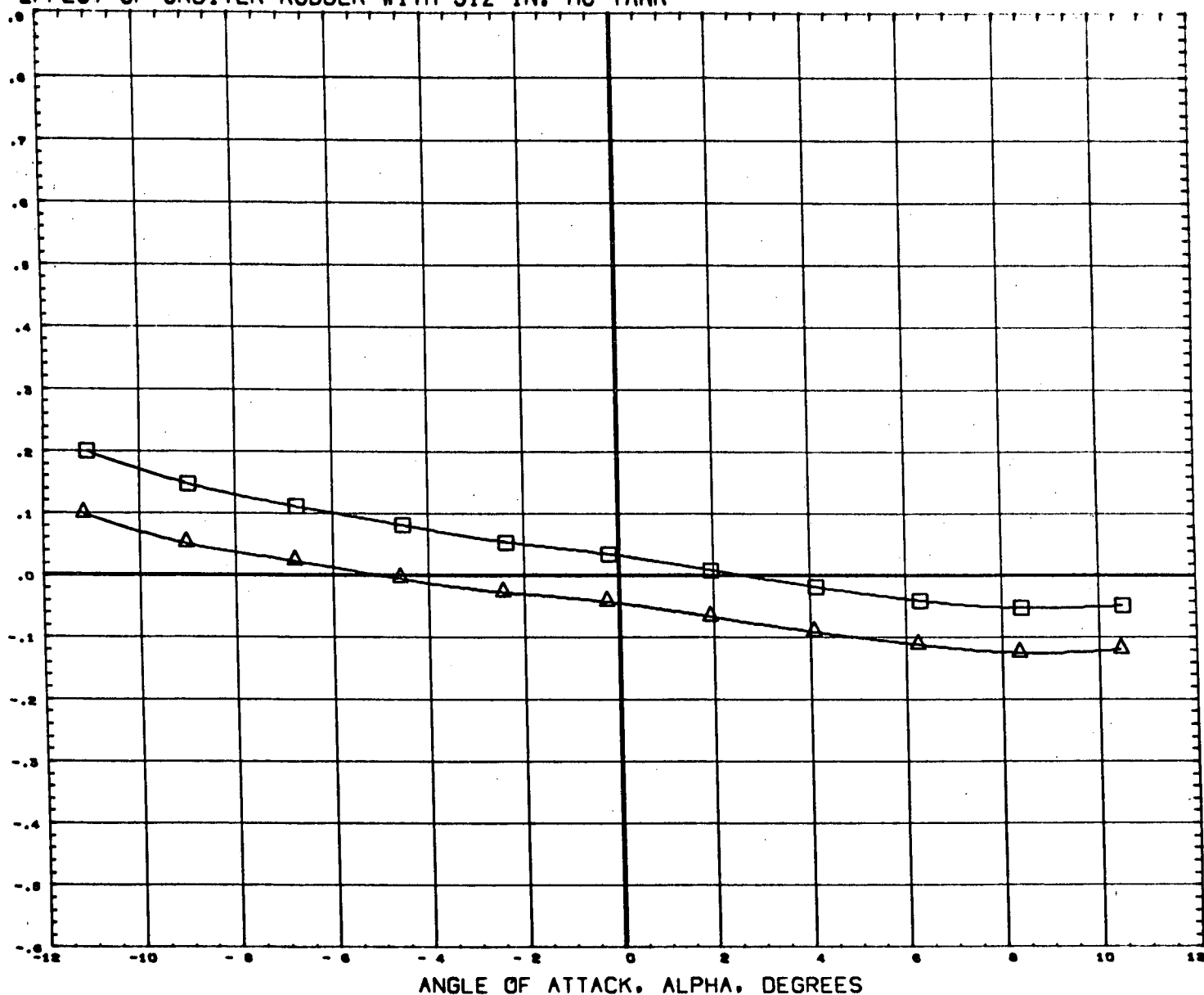
| ORBITAL | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|---------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0290 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH

1.20

EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK

PITCHING MOMENT COEFFICIENT, CLM



ANGLE OF ATTACK, ALPHA, DEGREES

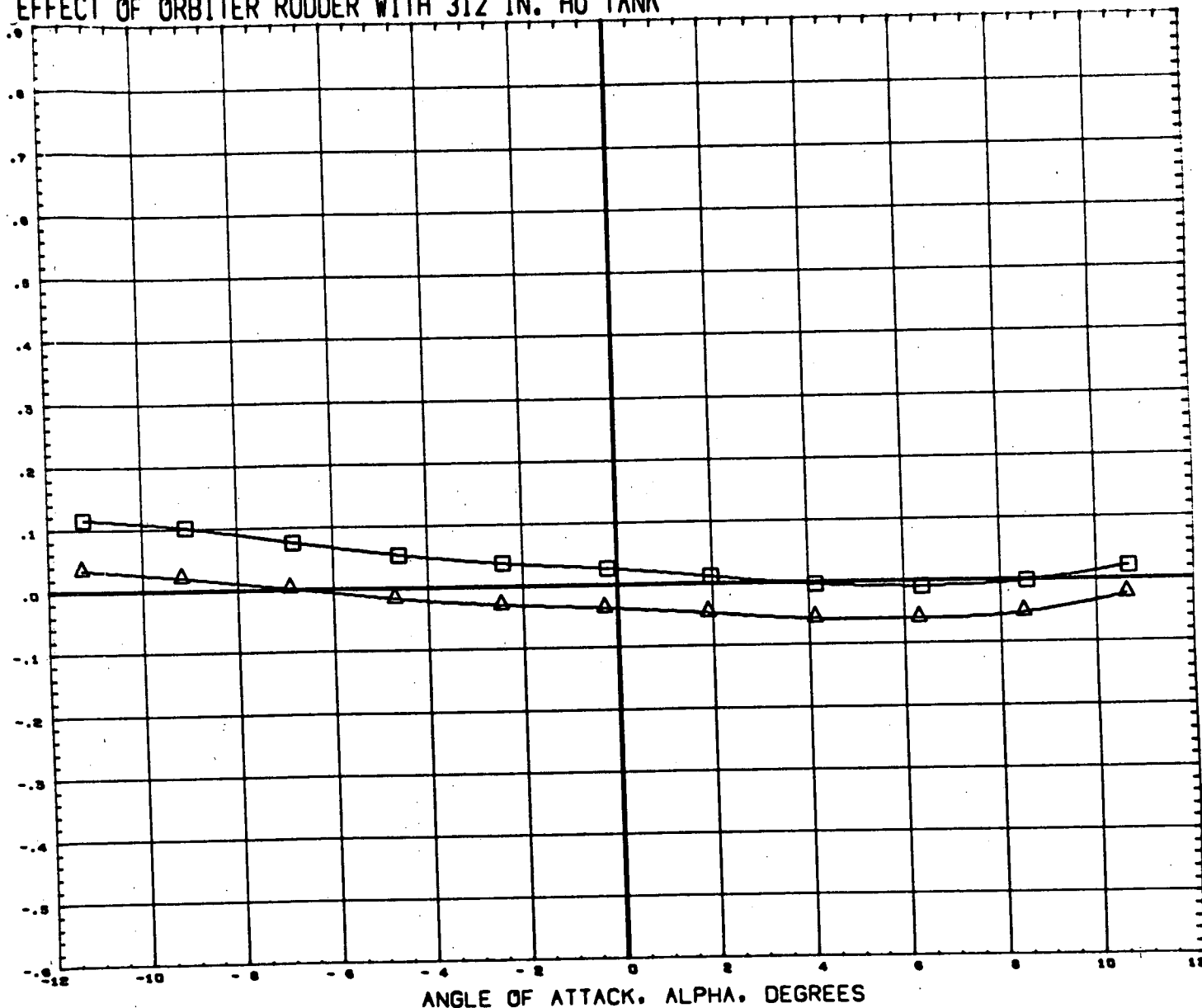
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (871135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4800 IN. |
| (871138) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK

PITCHING MOMENT COEFFICIENT, CLM



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 |
| (B71137) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (B71139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 |

| ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|---------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREP | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2400 IN. |
| | | | | SCALE | 0.0040 SCALE |

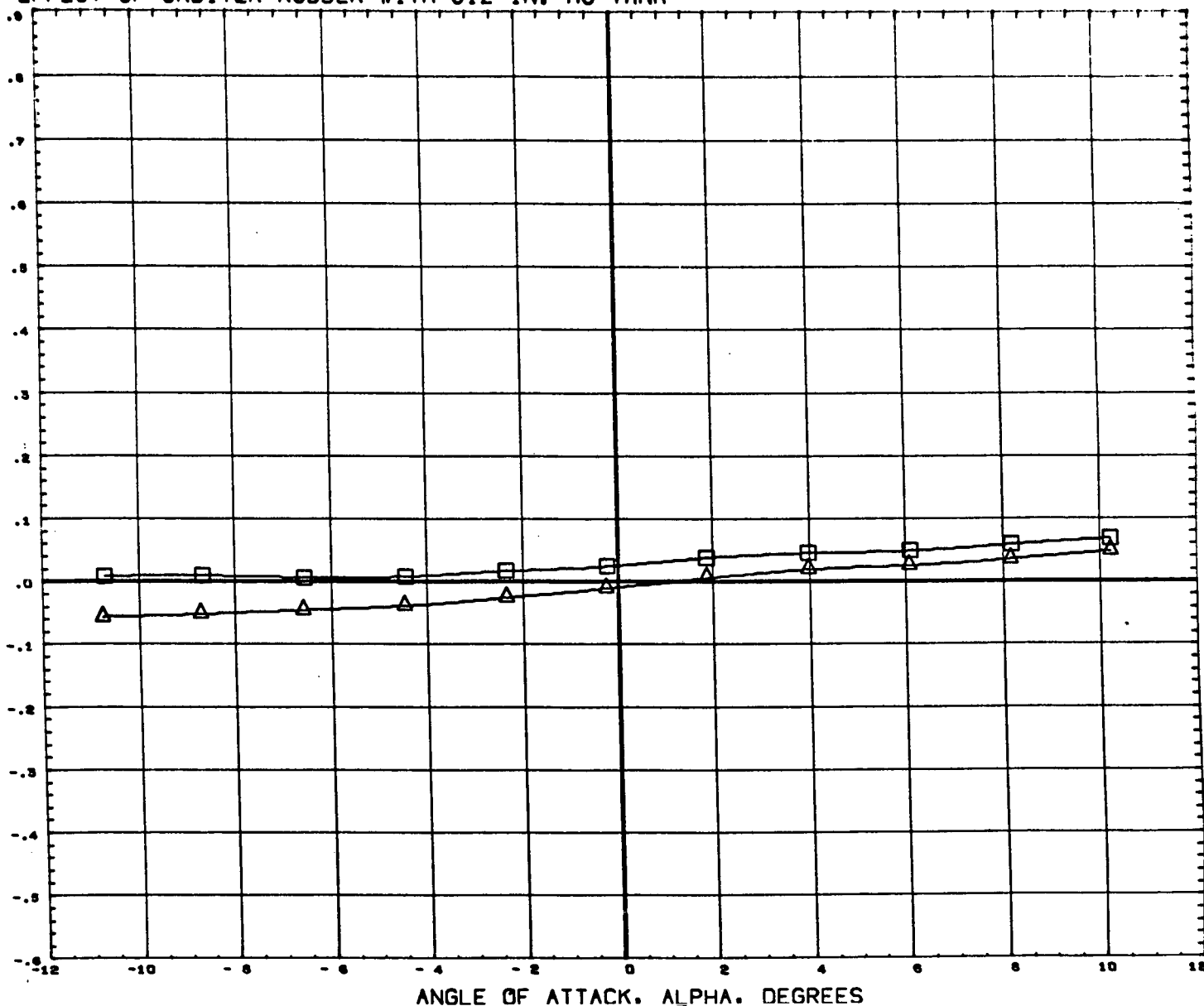
MACH

1.95

PAGE 503

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

PITCHING MOMENT COEFFICIENT, CLM



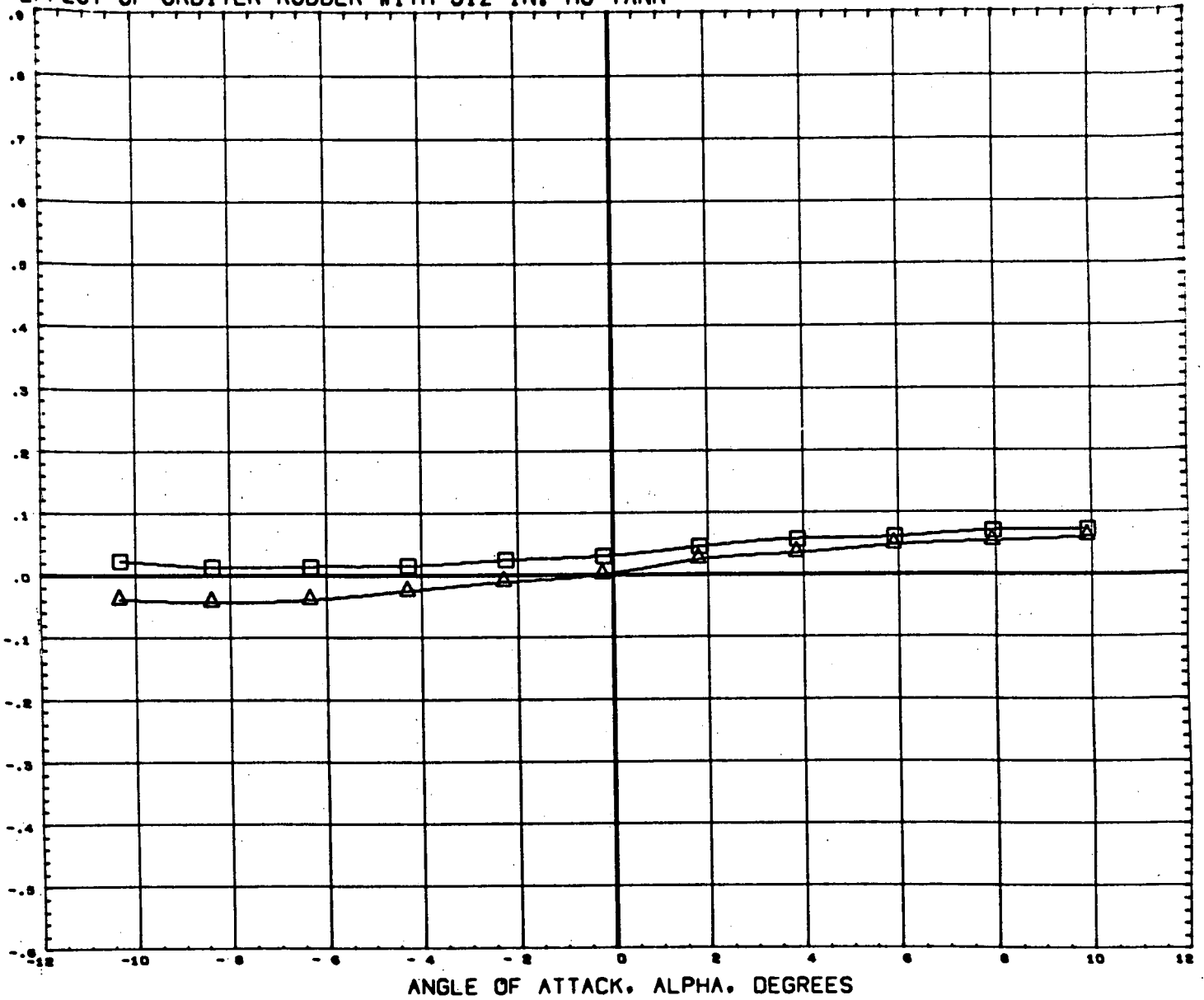
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4800 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

PAGE 504

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

PITCHING MOMENT COEFFICIENT, CLM

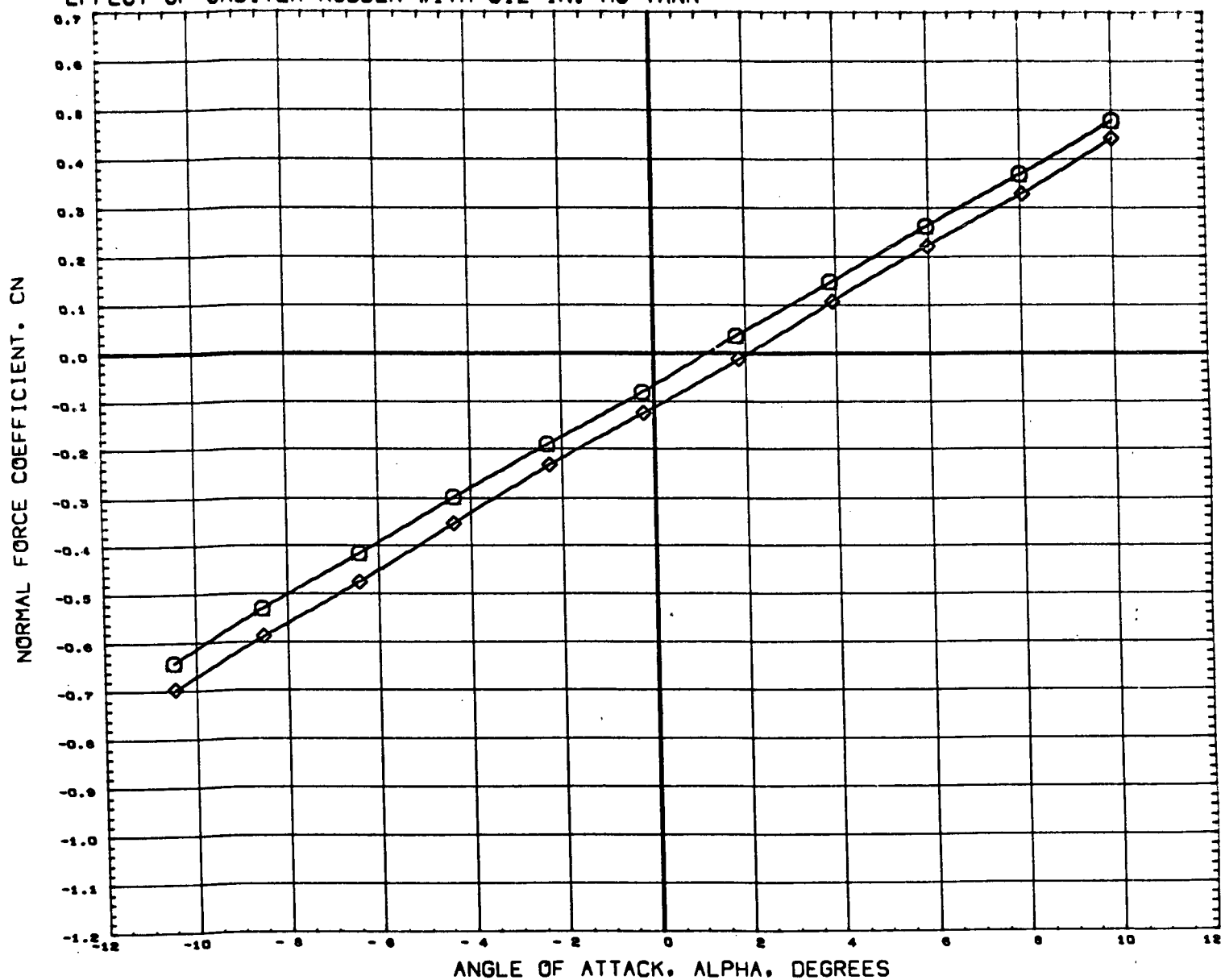


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6600 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREP | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

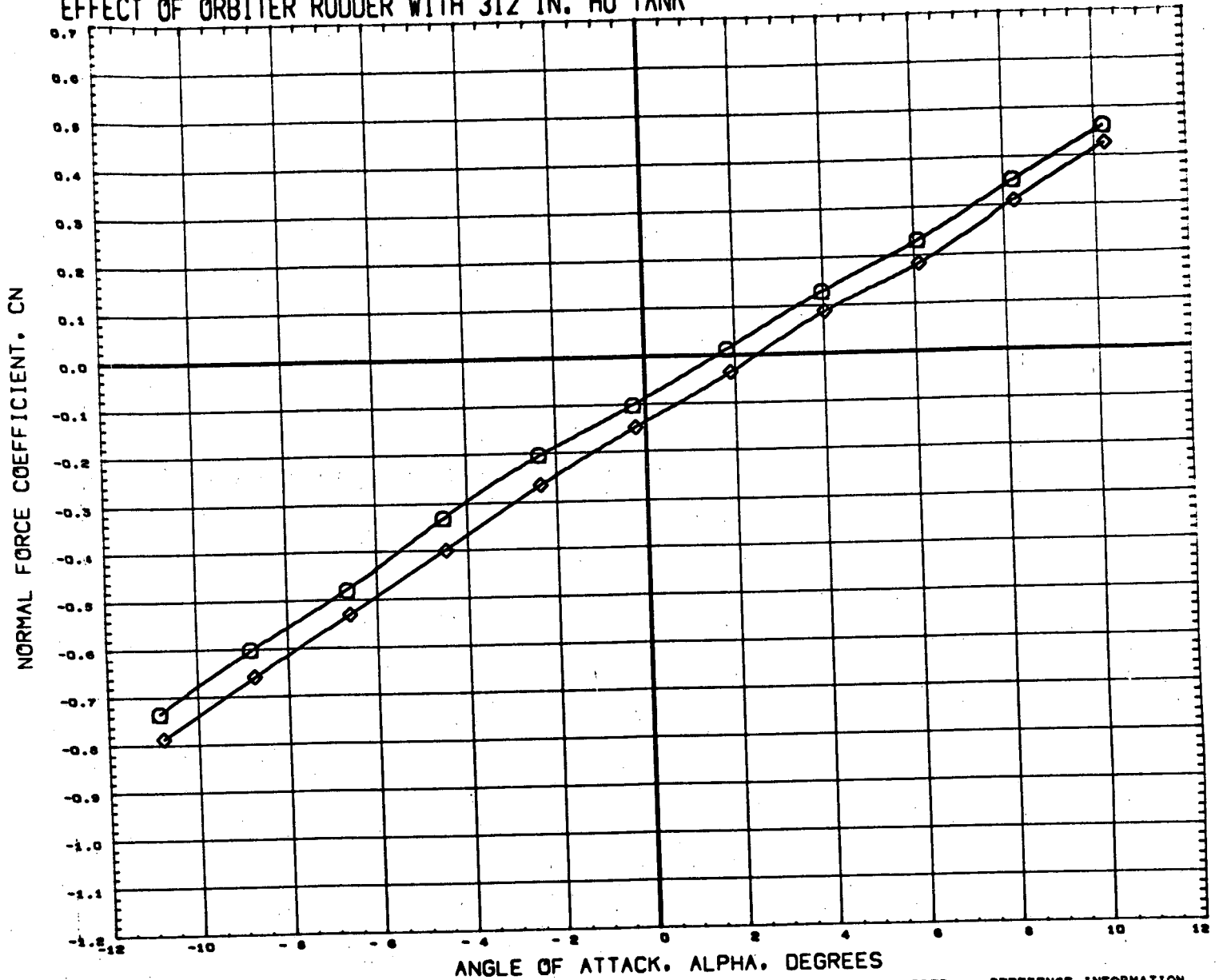


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



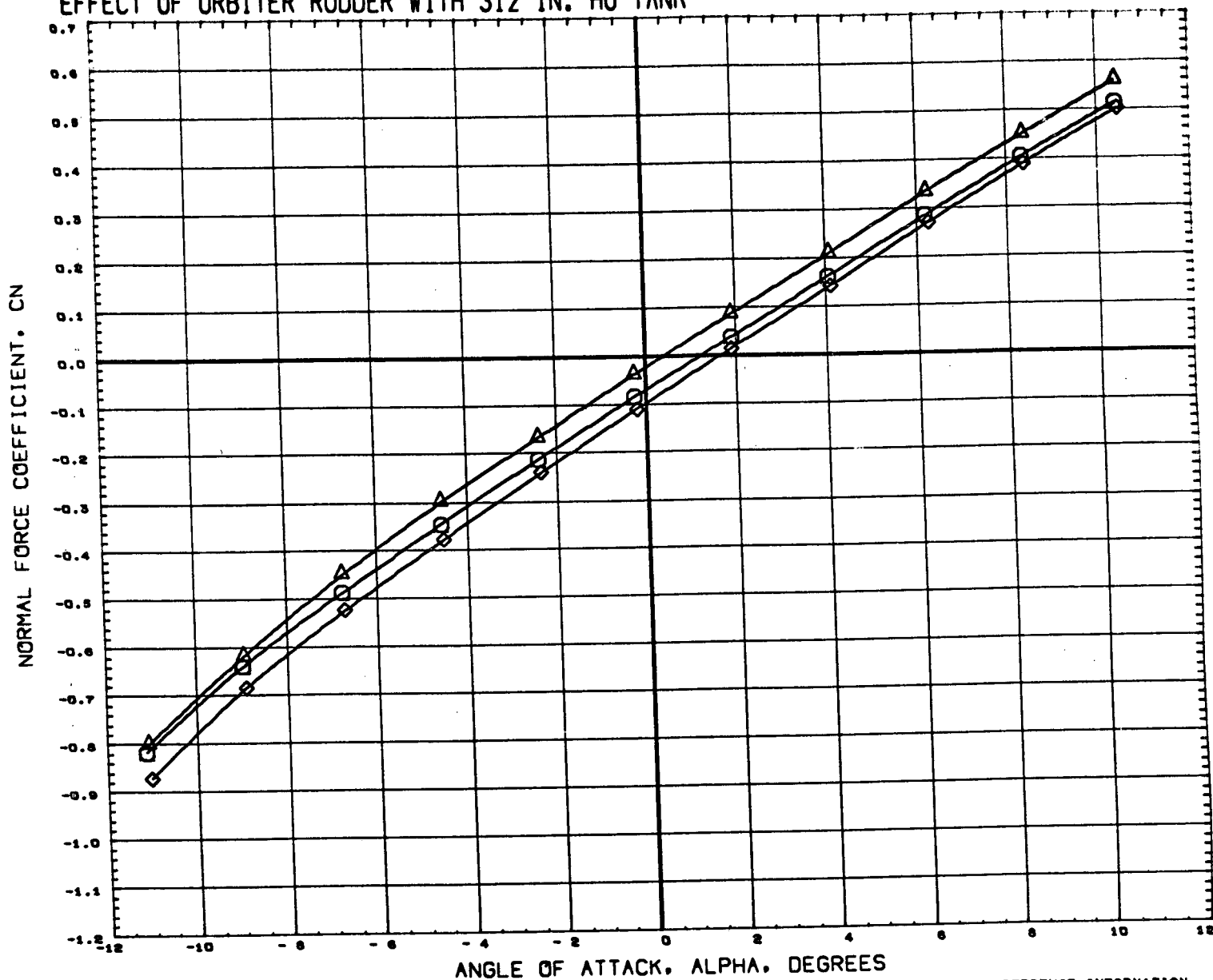
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | T901S1 |
|-----------------|---------------------------------------|--------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|--------|-------|--------|--------|-----------------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0260 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP 3.3600 IN. |
| | | | | YMRP 0.0000 IN. |
| | | | | ZMRP 0.2480 IN. |
| | | | | SCALE 0.0040 SCALE |

MACH .90

PAGE 507

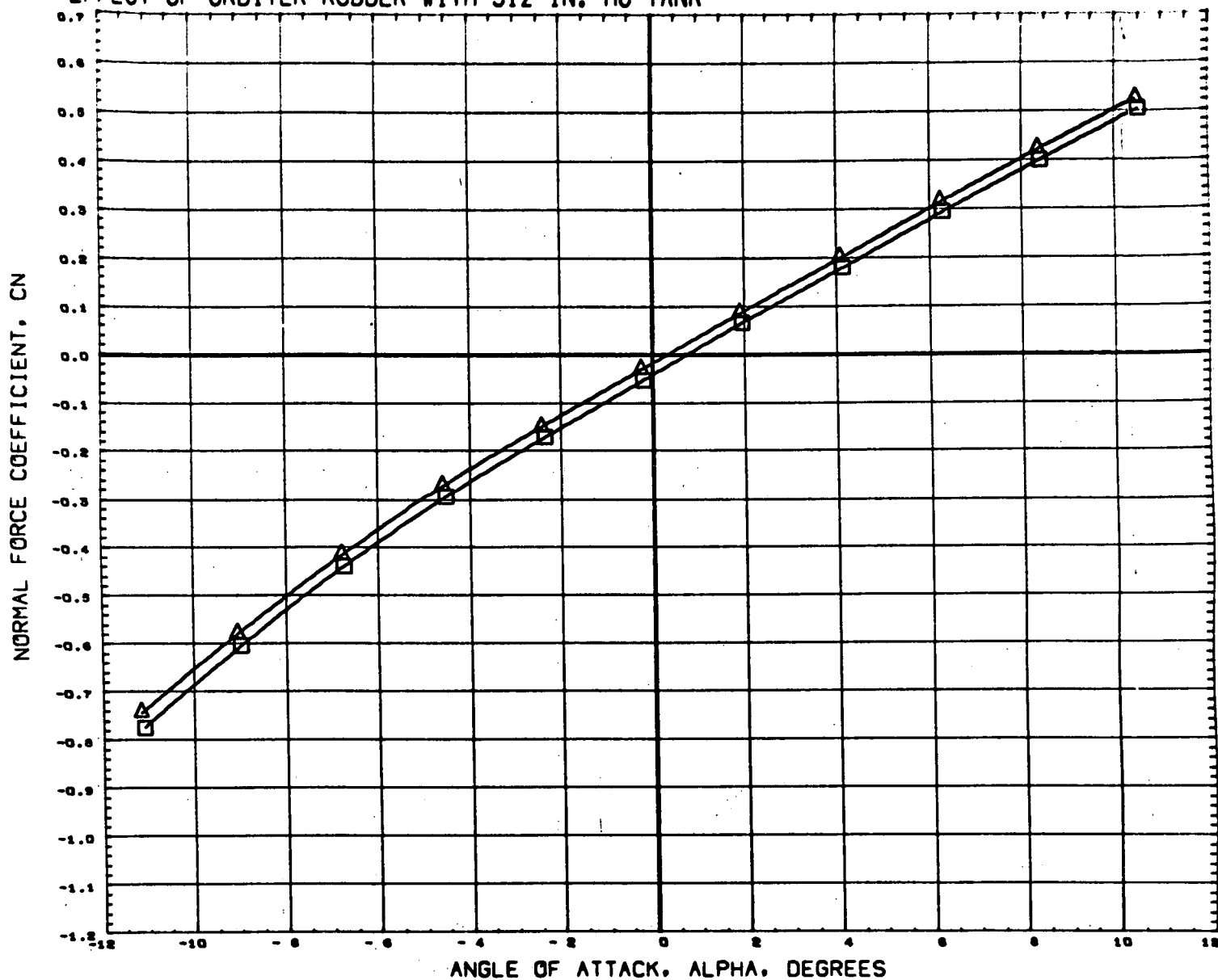
EFFECT OF ORBITER RUDDER WITH 312 IN. HQ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (D71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ.IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

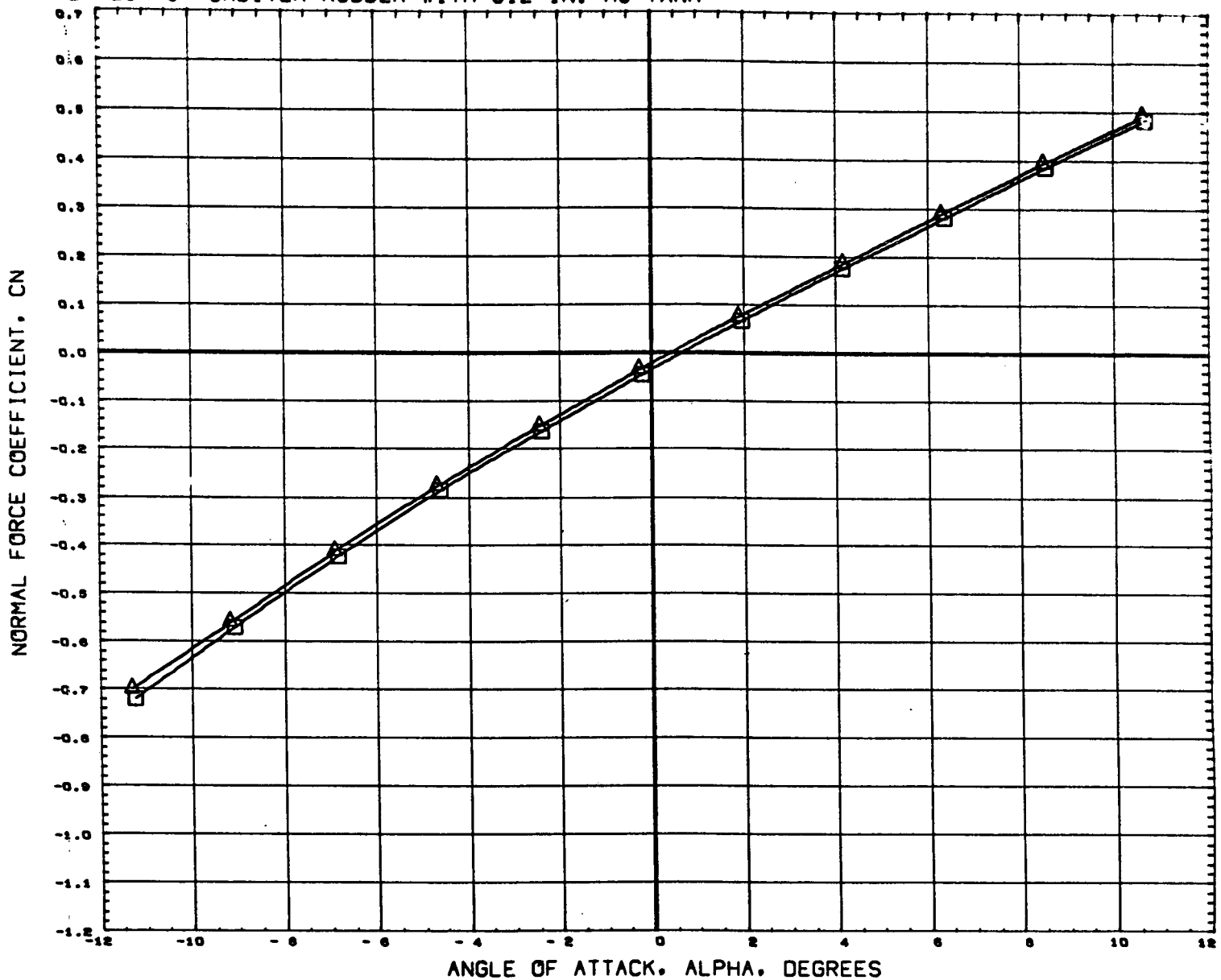


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YB | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

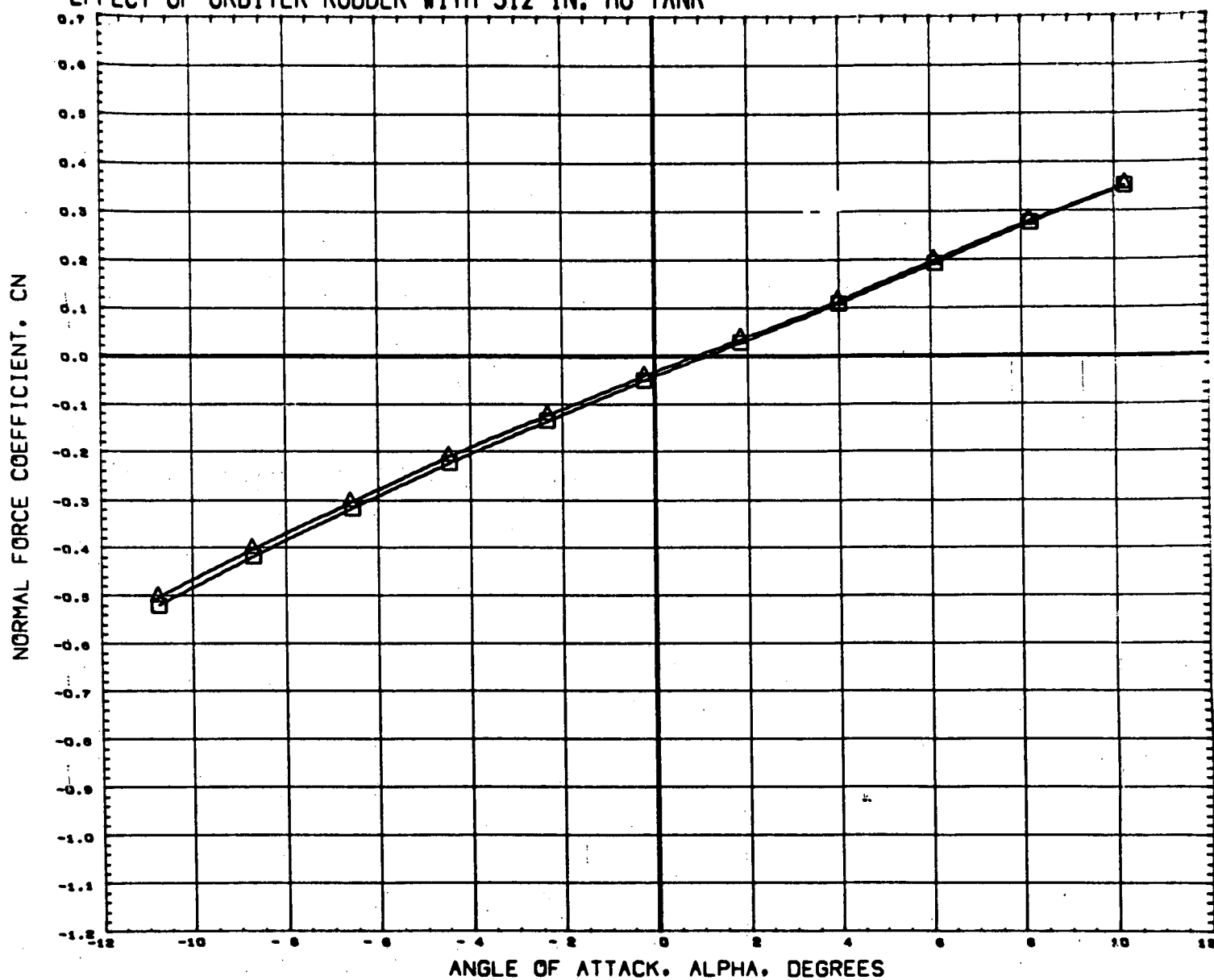


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

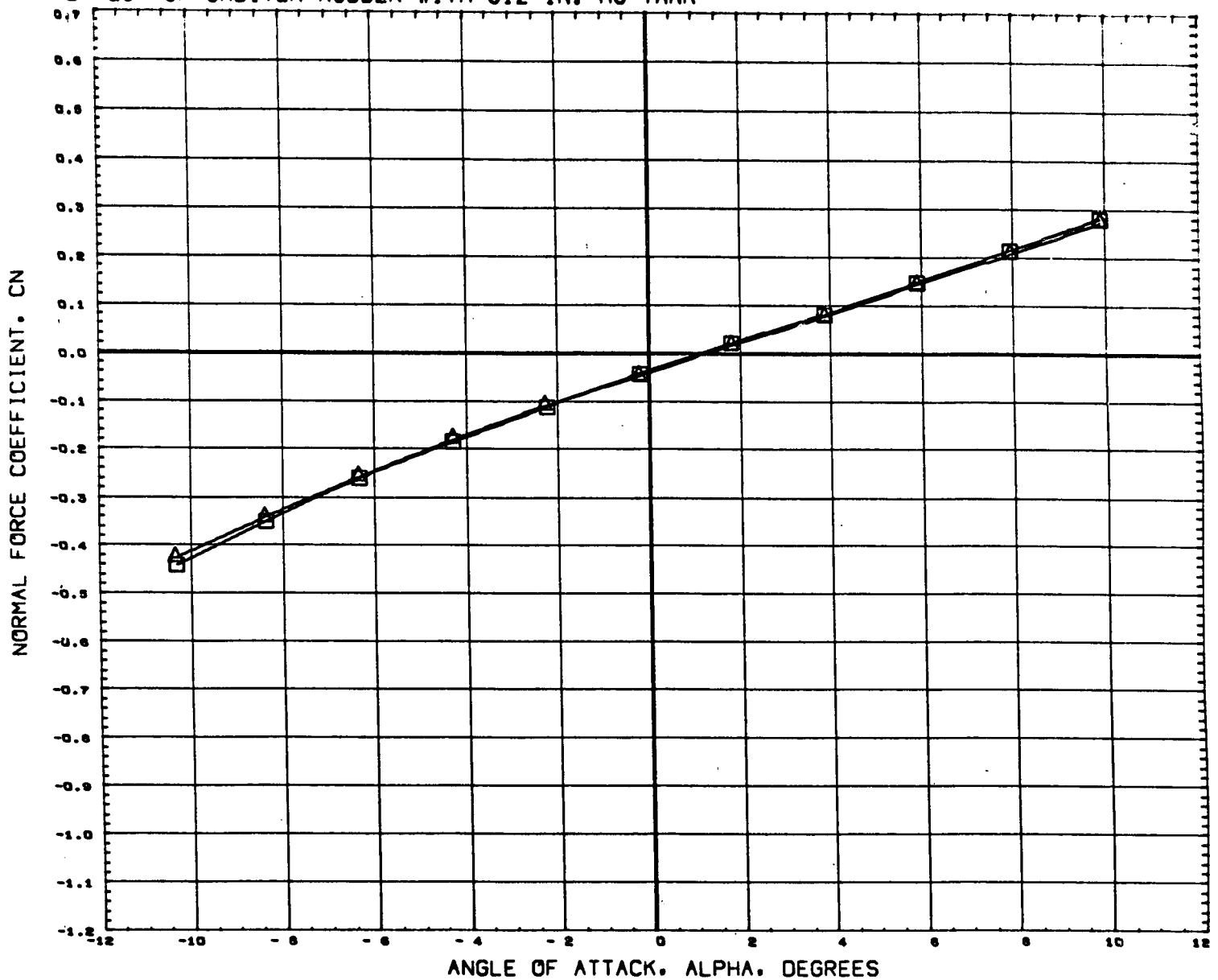


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|-------|-------|--------|--------|-----------------------|----------------|
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71135) | NSPC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0265 IN. |
| (B71137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71139) | NSPC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XHRP | 3.3600 IN. |
| | | | | | | YHRP | 0.0000 IN. |
| | | | | | | ZHRP | 0.2400 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



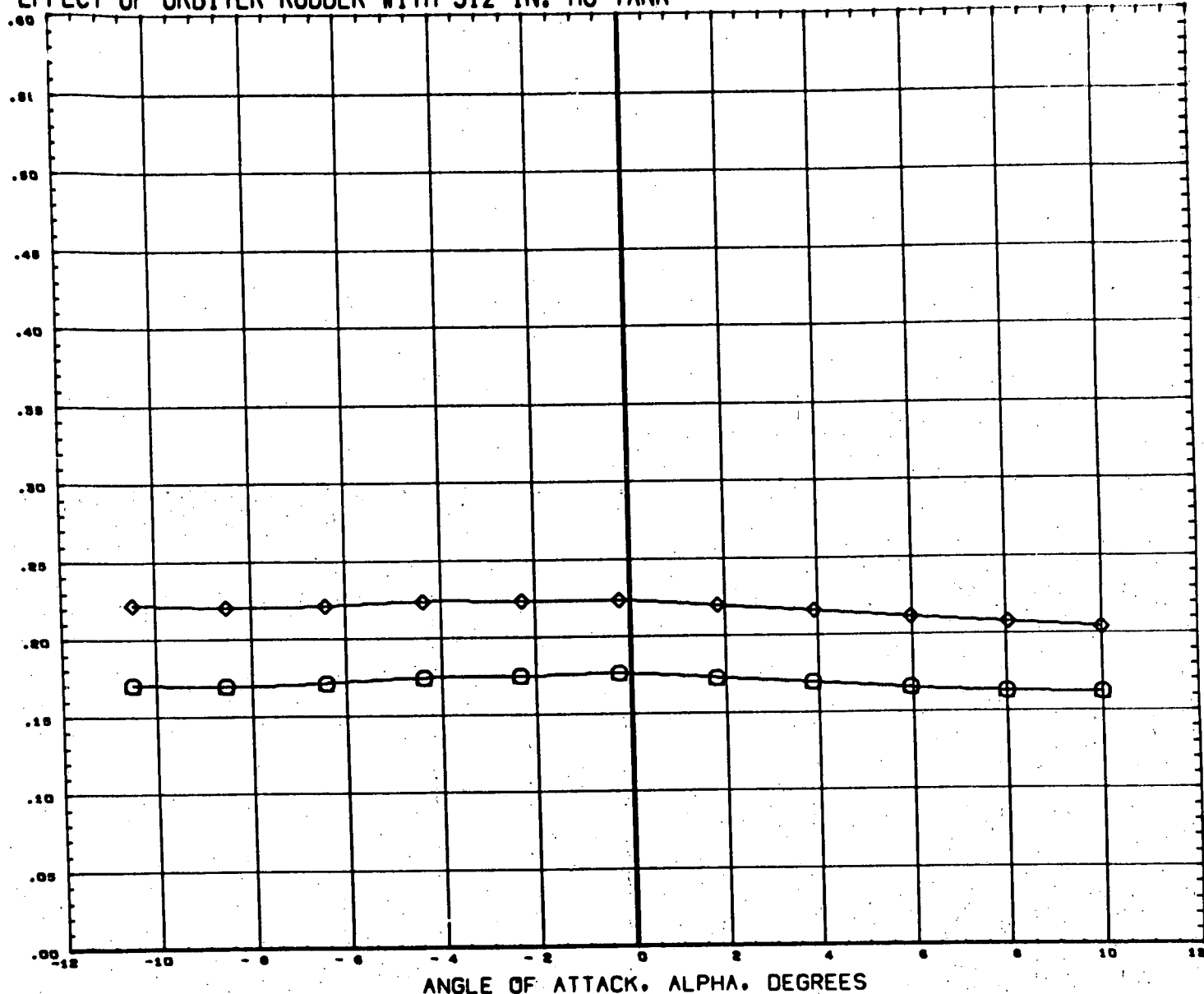
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBSIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

AXIAL FORCE COEFFICIENT, CA

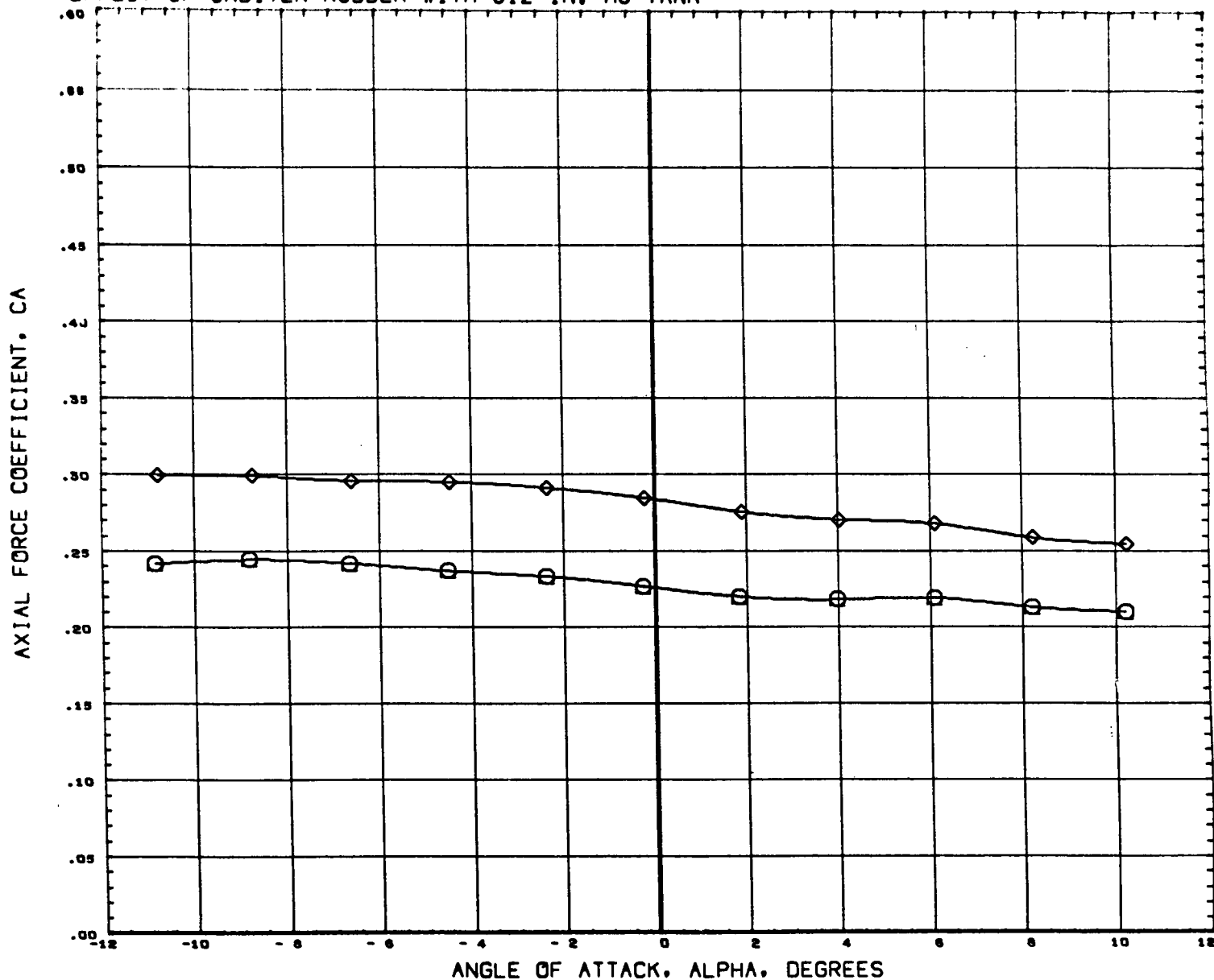


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK

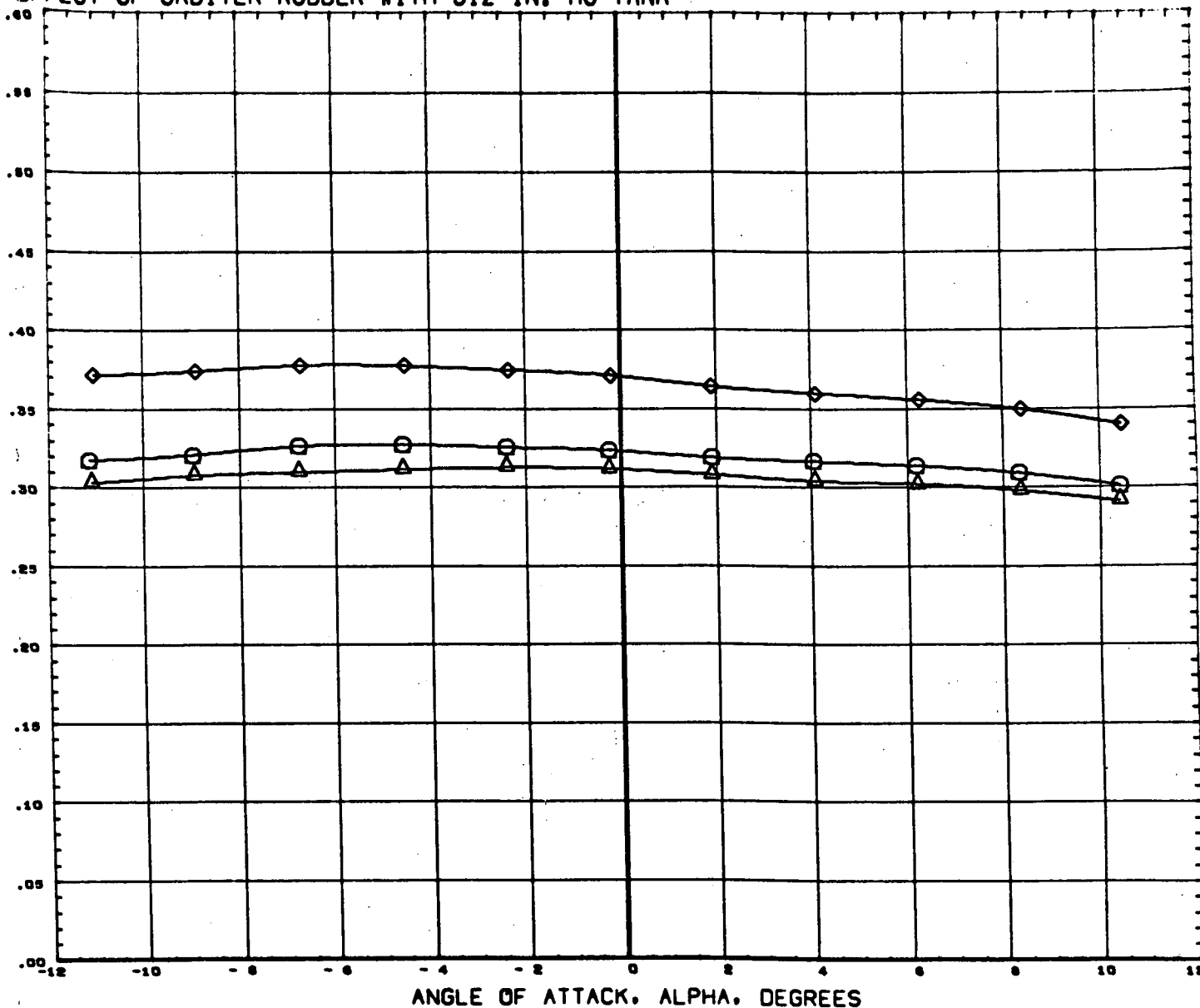


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (871137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

AXIAL FORCE COEFFICIENT, C_A



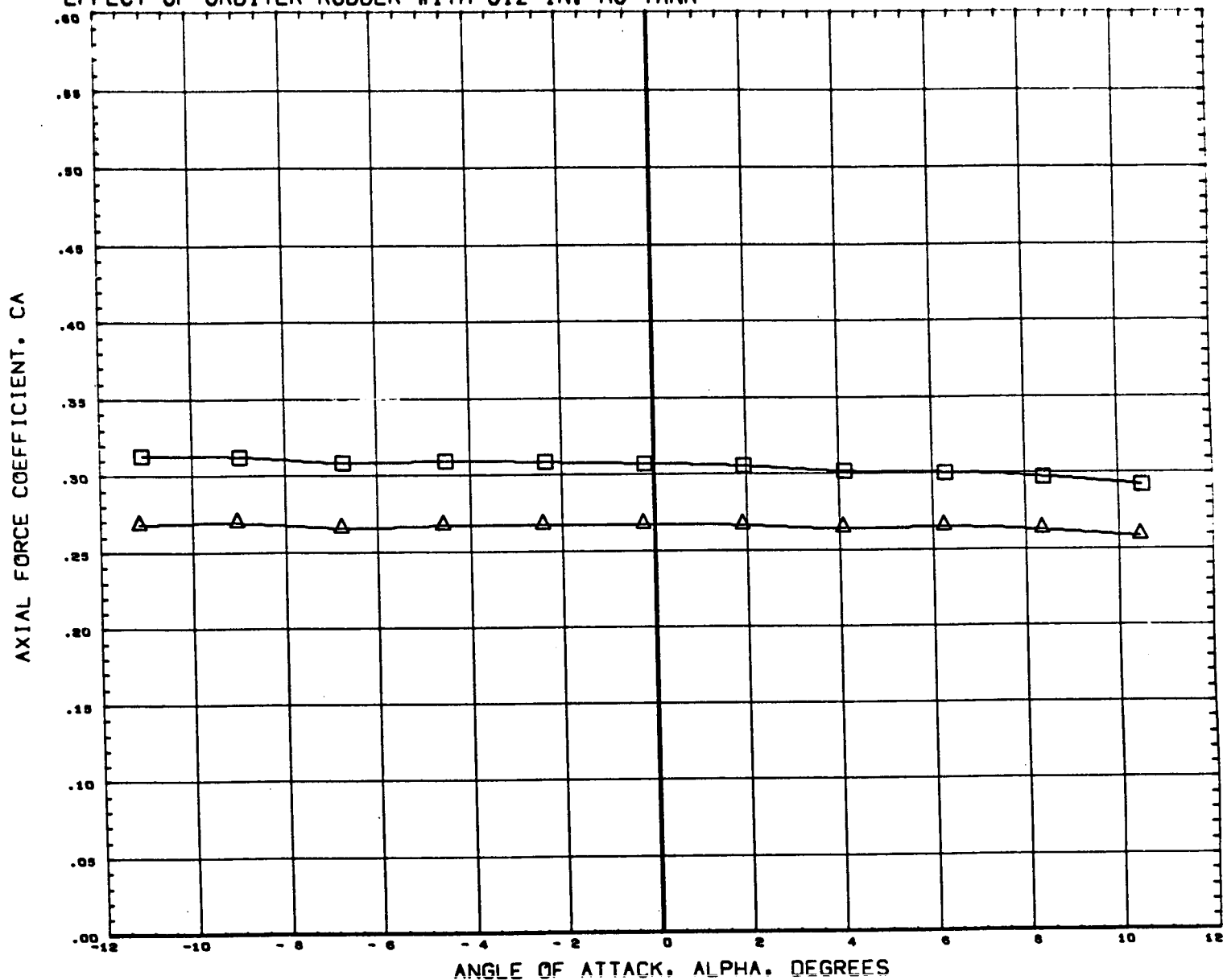
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBN | Y3 | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|-------|-------|--------|--------|-----------------------|--------|---------|
| (071135) | NSFC TWT 344X LAUNCH VEHICLE STUDIES T90151 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6600 | 30. IN. |
| (071135) | NSFC TWT 344X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0260 | IN. |
| (071137) | NSFC TWT 344X LAUNCH VEHICLE STUDIES T90151 | 0.000 | 0.023 | 0.000 | 30.000 | SREP | 4.4600 | IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2400 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH

1.20

PAGE 515

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



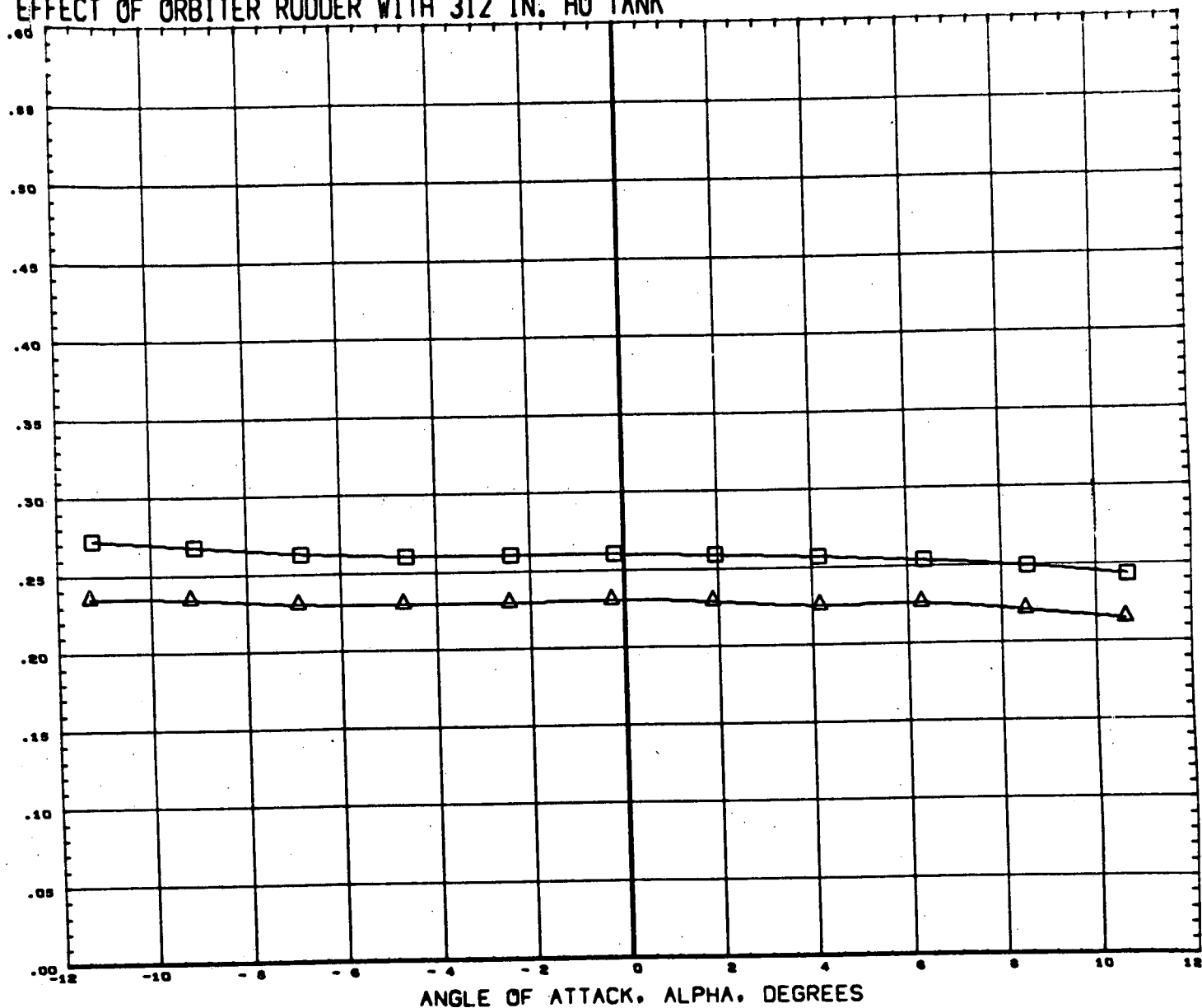
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.46

PAGE 516

EFFECT OF ORBITER RUDDER WITH 312 IN. H₂O TANK

AXIAL FORCE COEFFICIENT, C_A



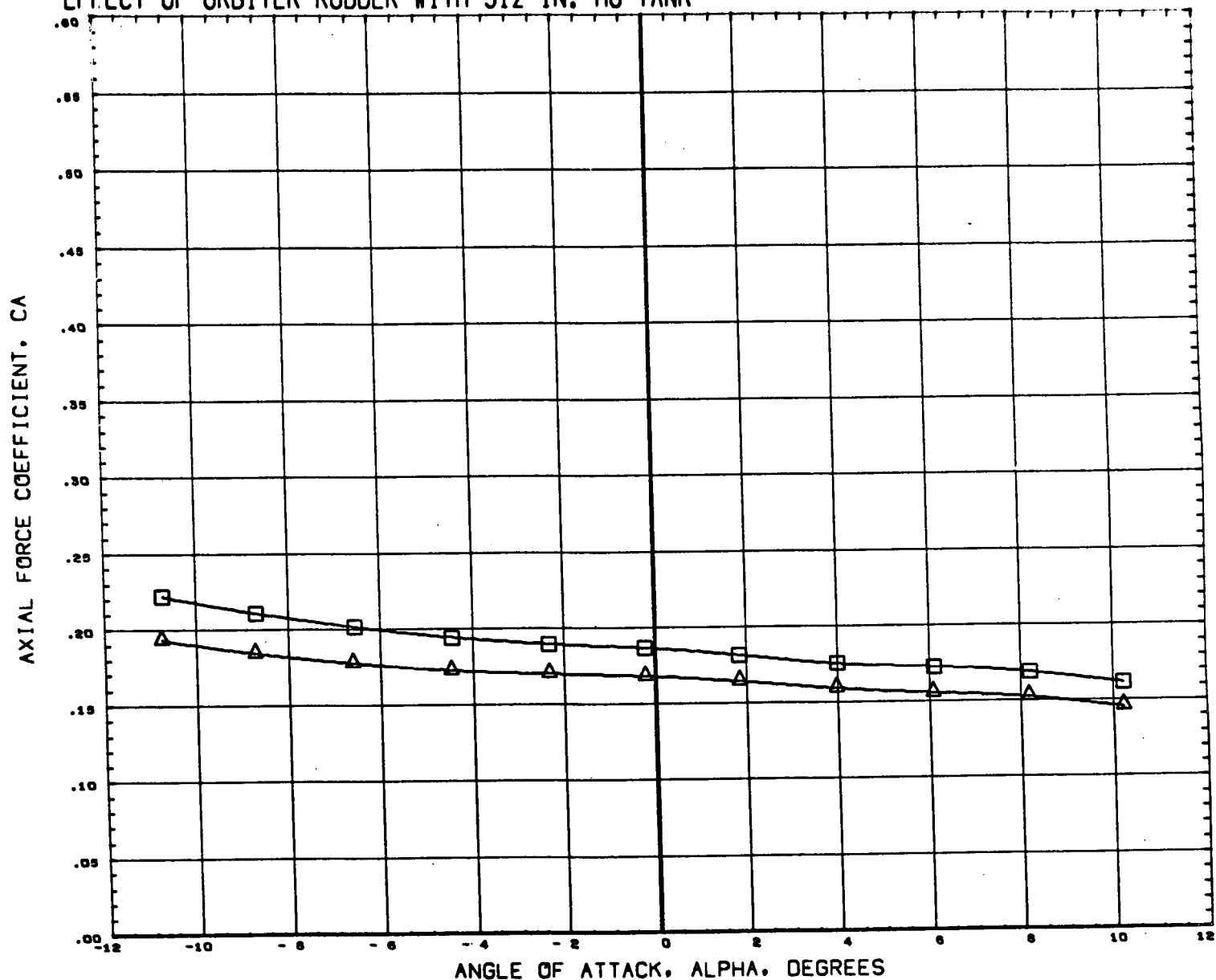
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LRFP | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BRFP | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.95

PAGE 517

EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 |

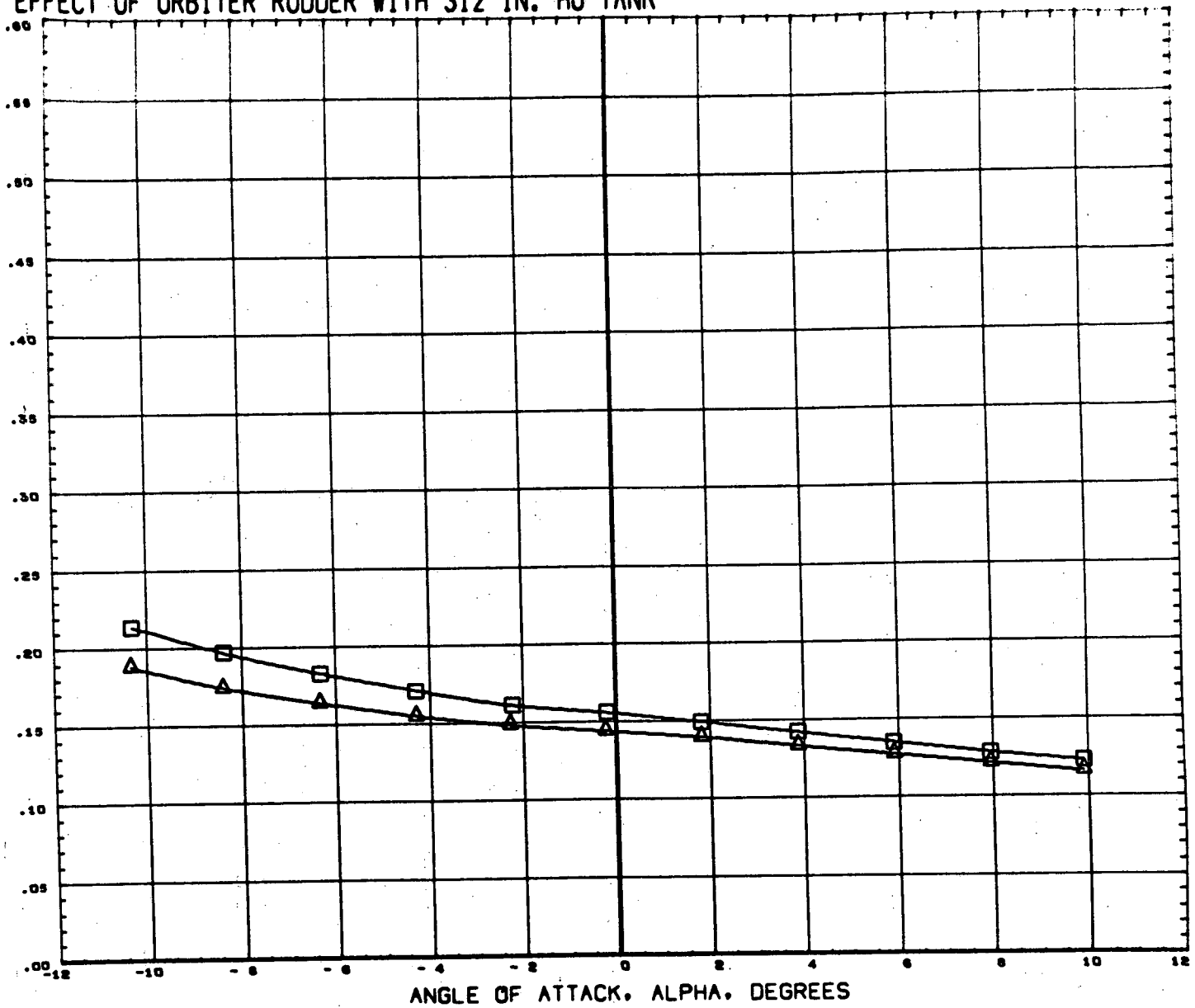
| ORBIT | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRR | 3.3600 IN. |
| | | | | YMRR | 0.0000 IN. |
| | | | | ZMRR | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH 3.48

PAGE 518

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

AXIAL FORCE COEFFICIENT, CA



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (B71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 |
| (B71137) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (B71139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 |

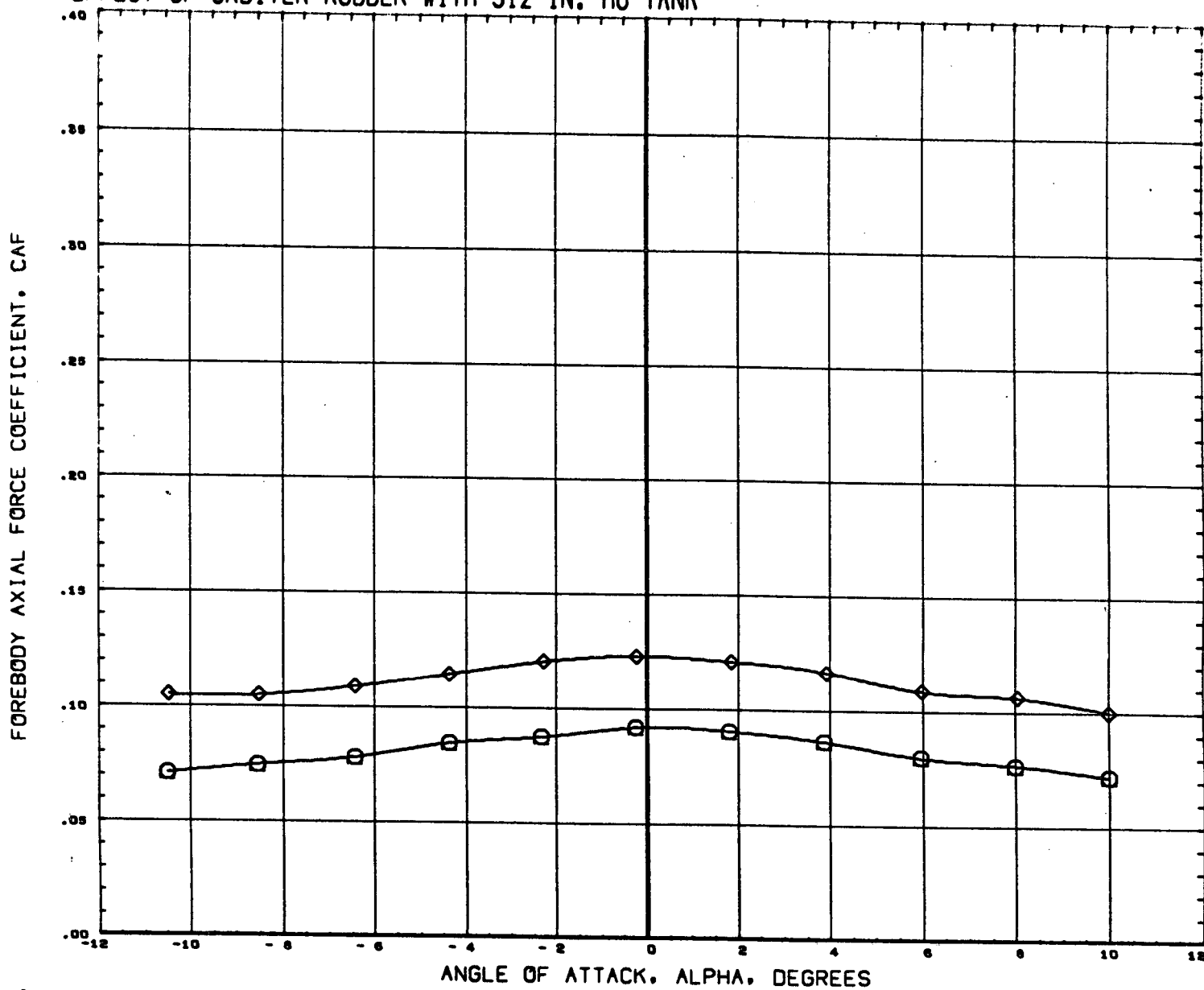
| ORBIT INC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREP | 4.4800 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH

4.96

PAGE 519

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

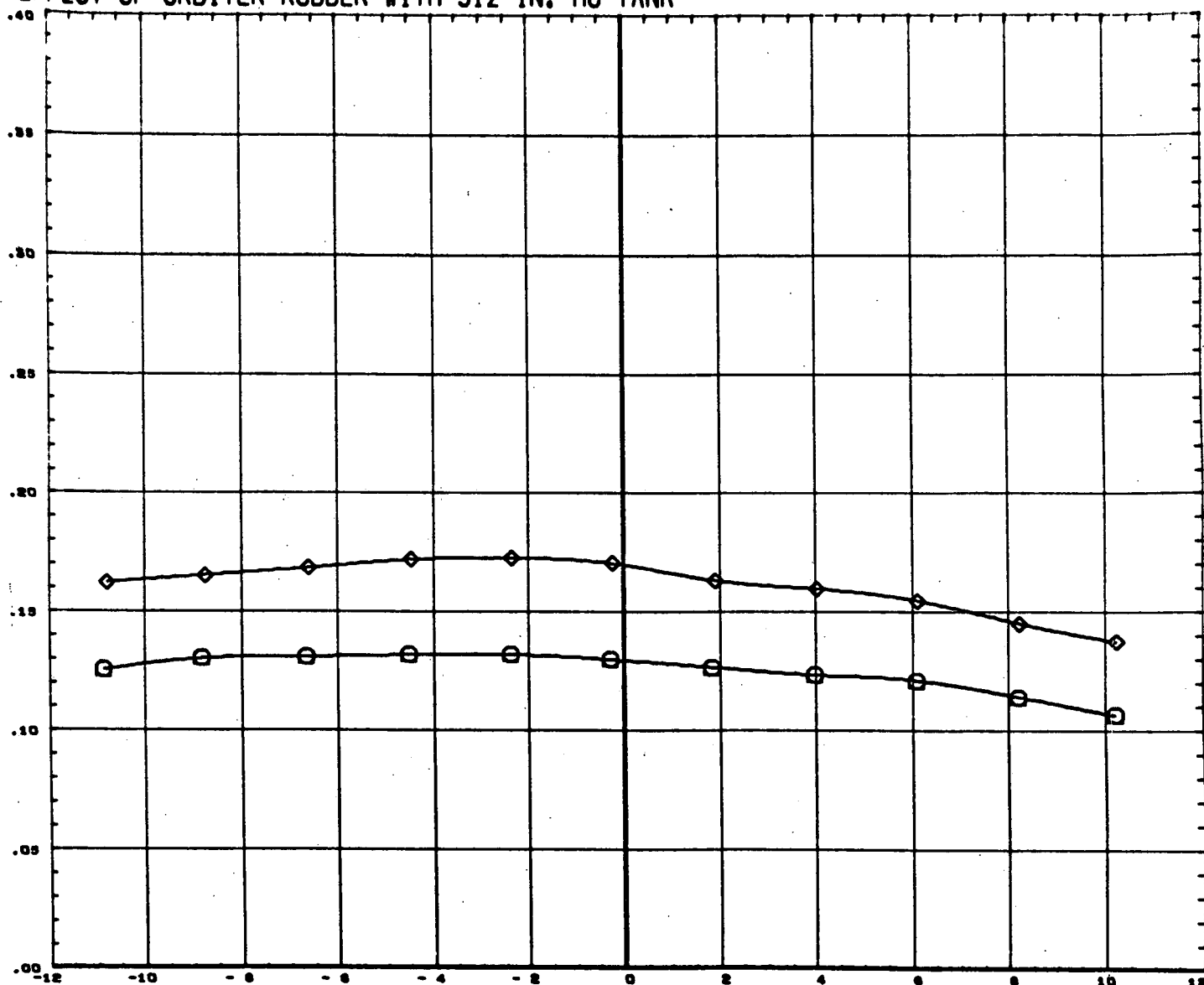


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITAL | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 34. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK

FOREBODY AXIAL FORCE COEFFICIENT, C_{AF}



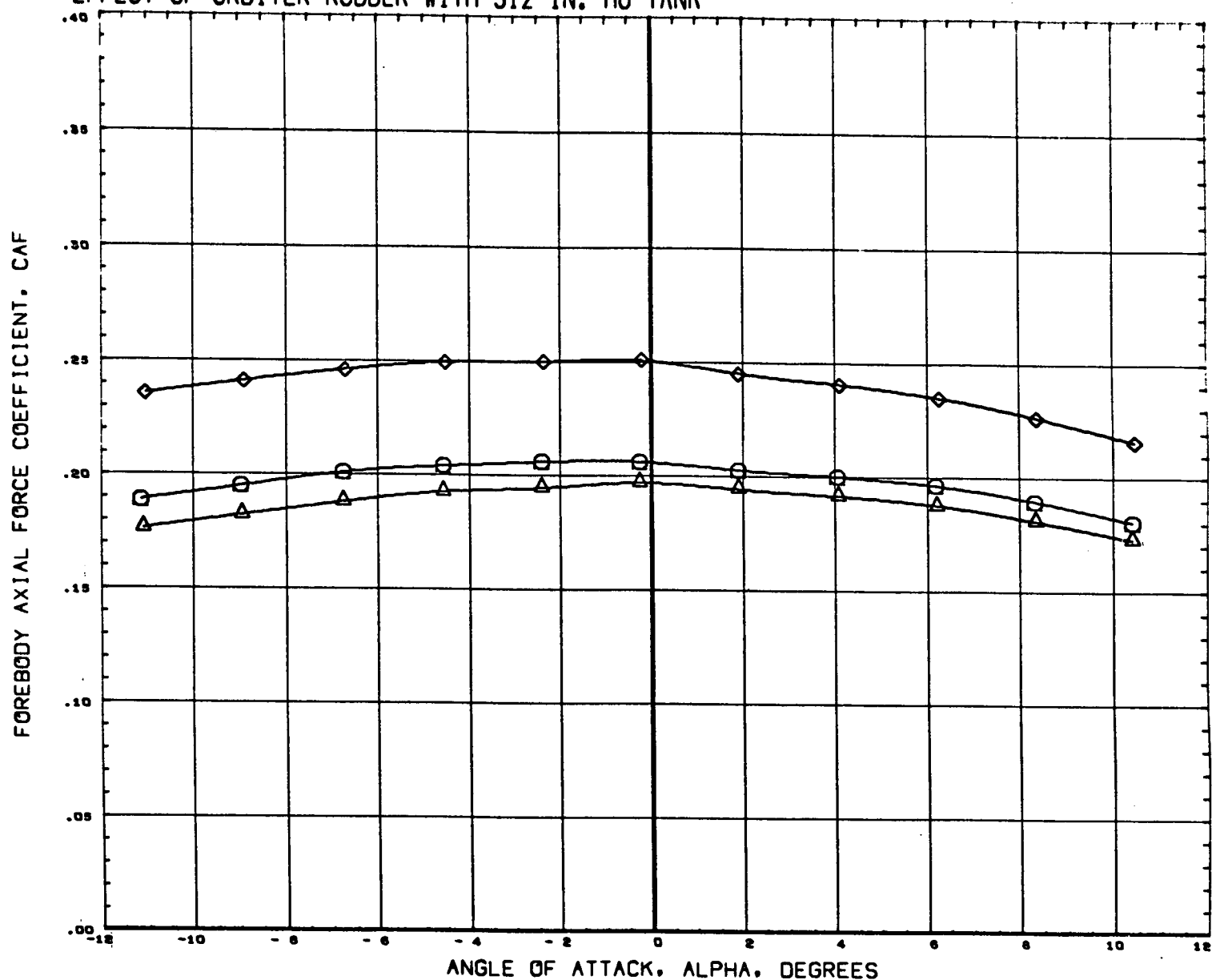
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



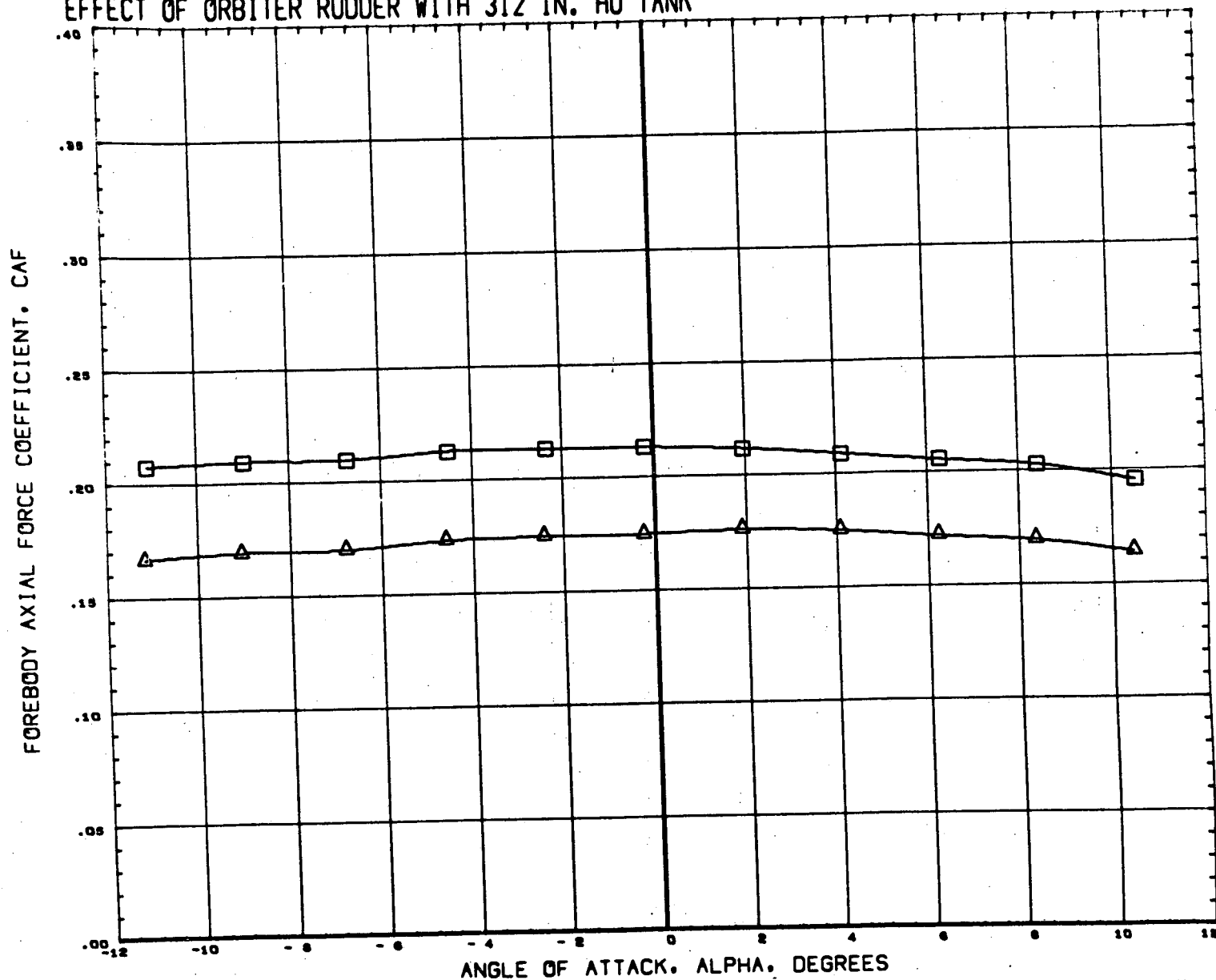
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (871137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (871139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 1.20

PAGE 522

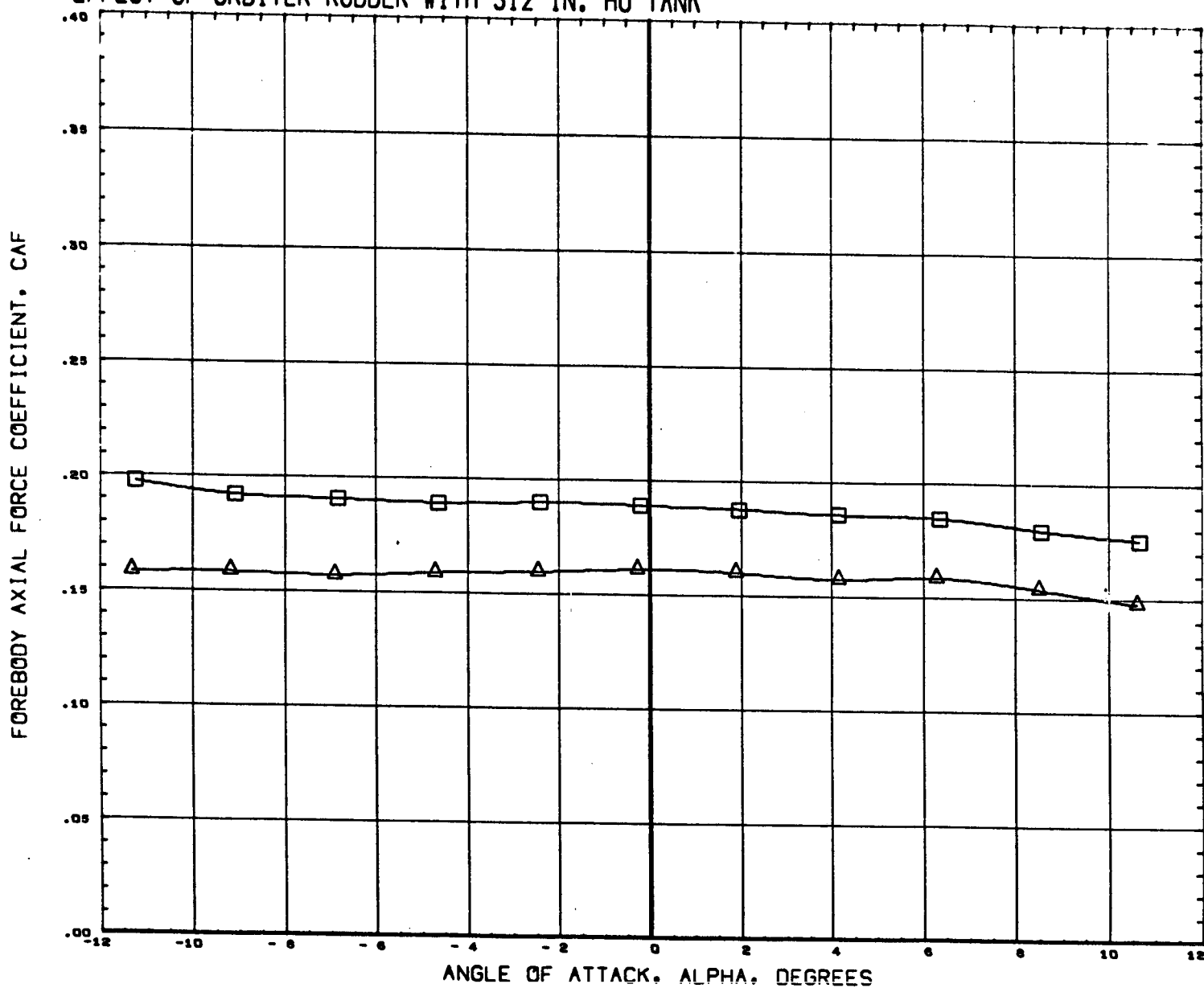
EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

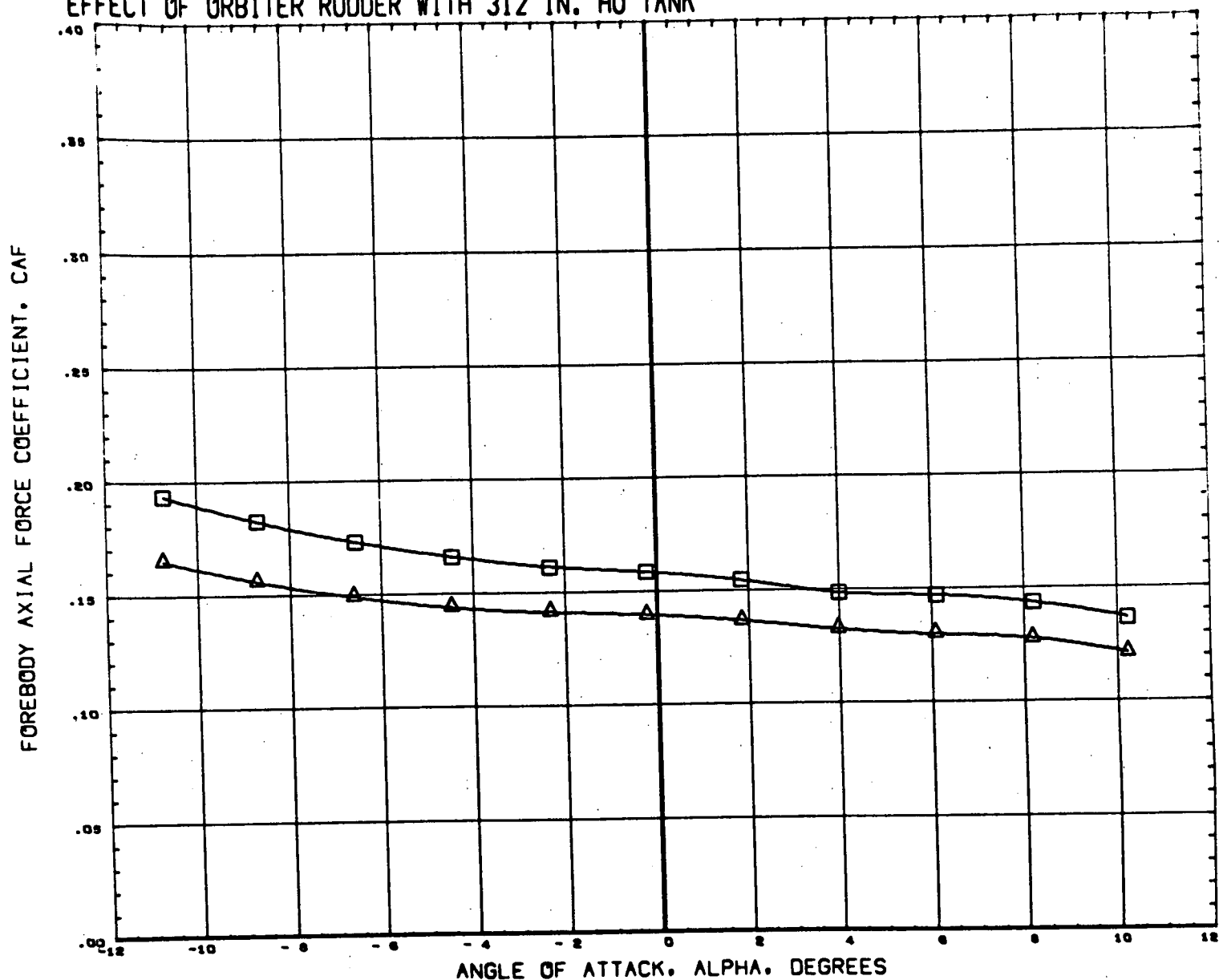
EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

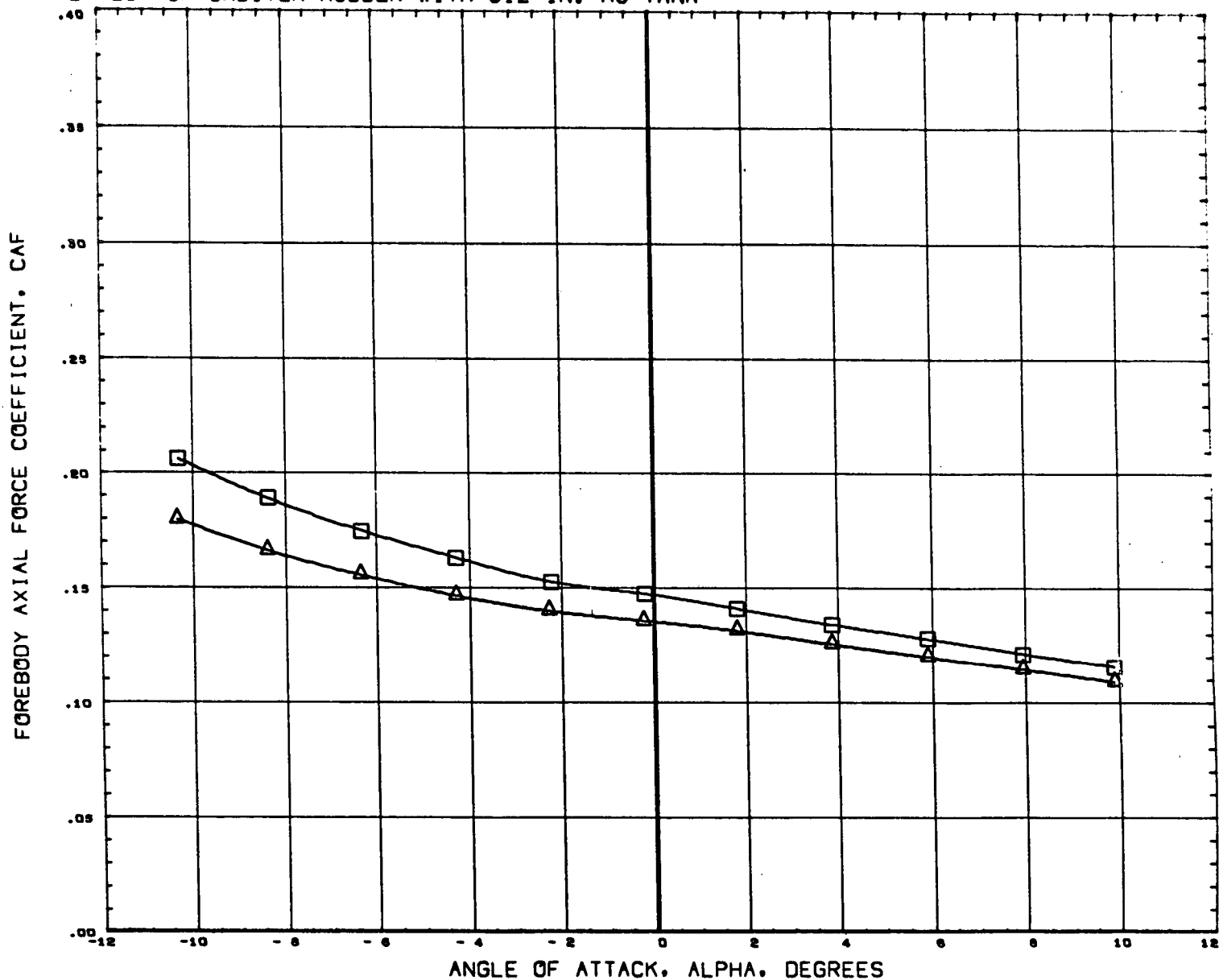


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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871139) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



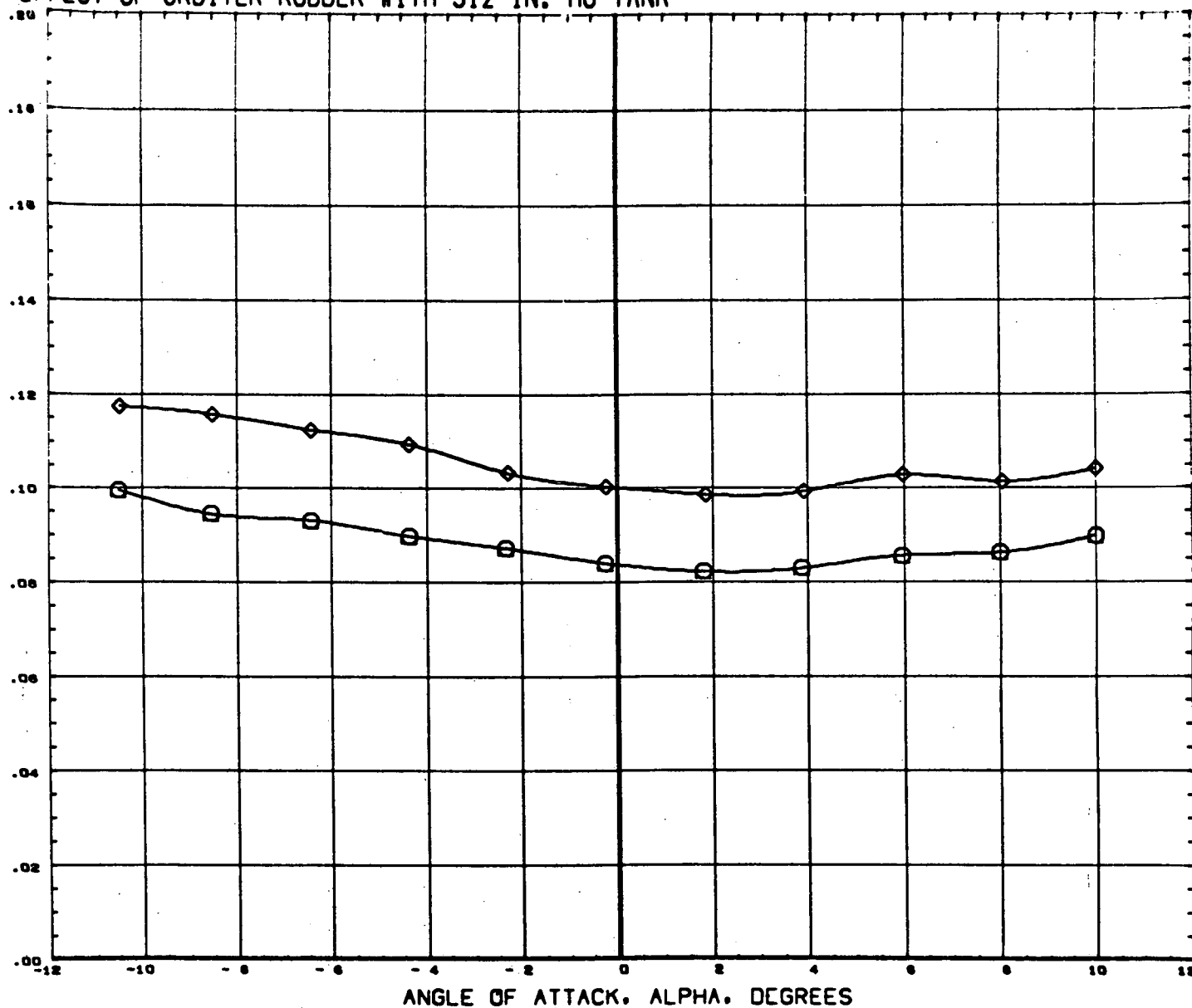
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.025 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.025 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

BASE AXIAL FORCE COEFFICIENT, C_{AB}



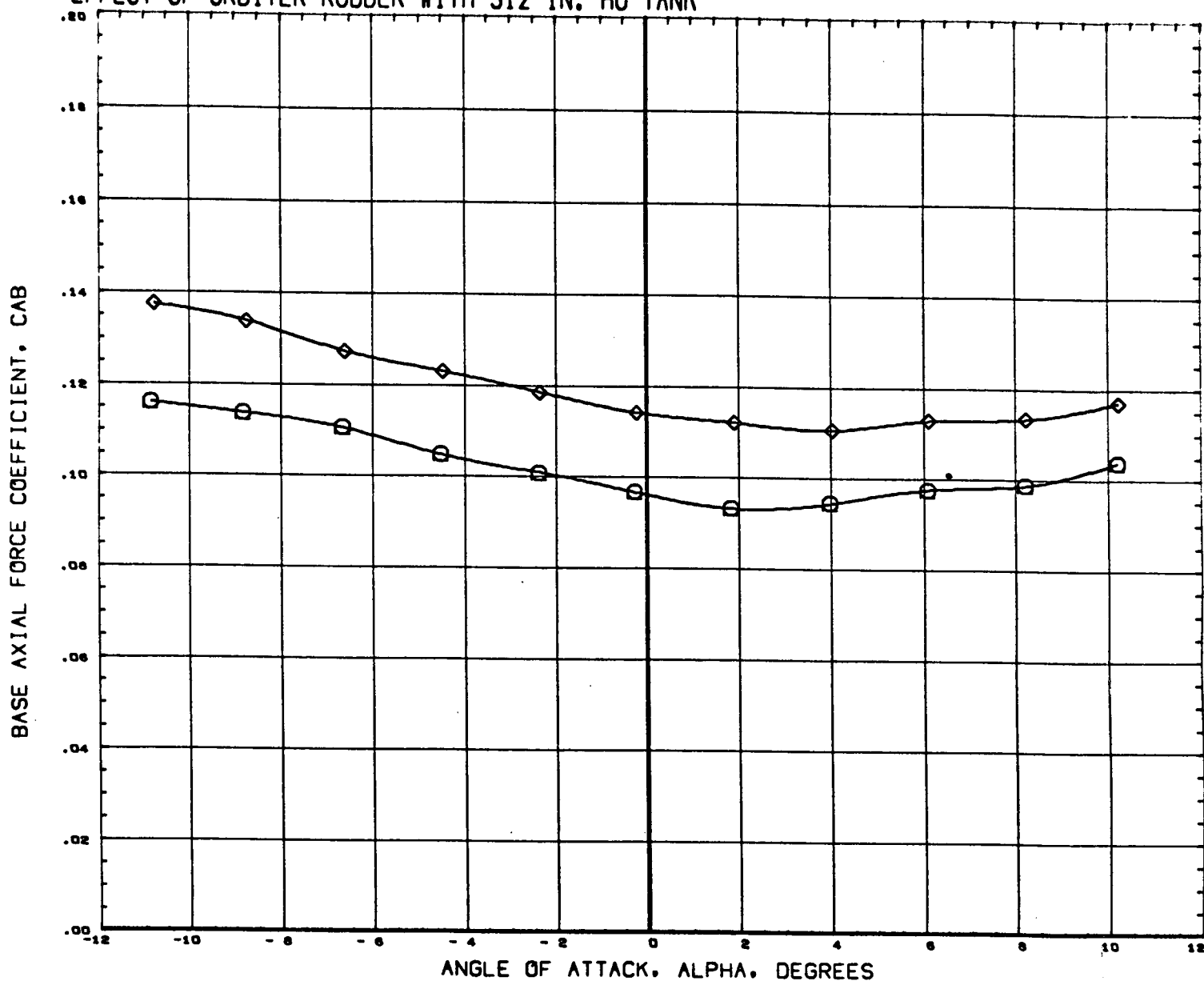
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|-----------------|---|---------|----------------|--------|--------|-----------------------|--------|---------|
| (D71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 | 50. IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (B71137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (B71139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH

.60

PAGE 527

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

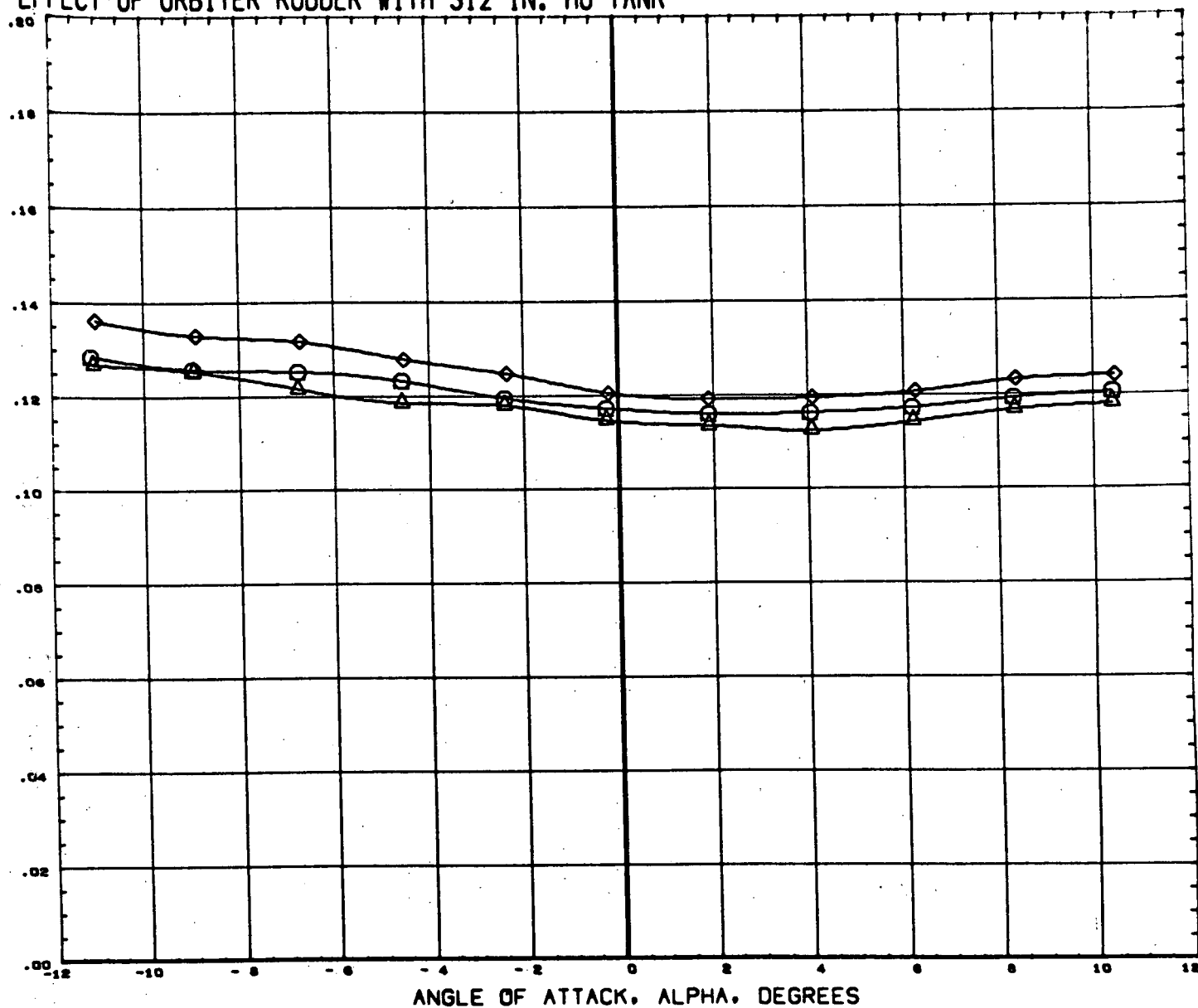


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

BASE AXIAL FORCE COEFFICIENT, C_{AB}



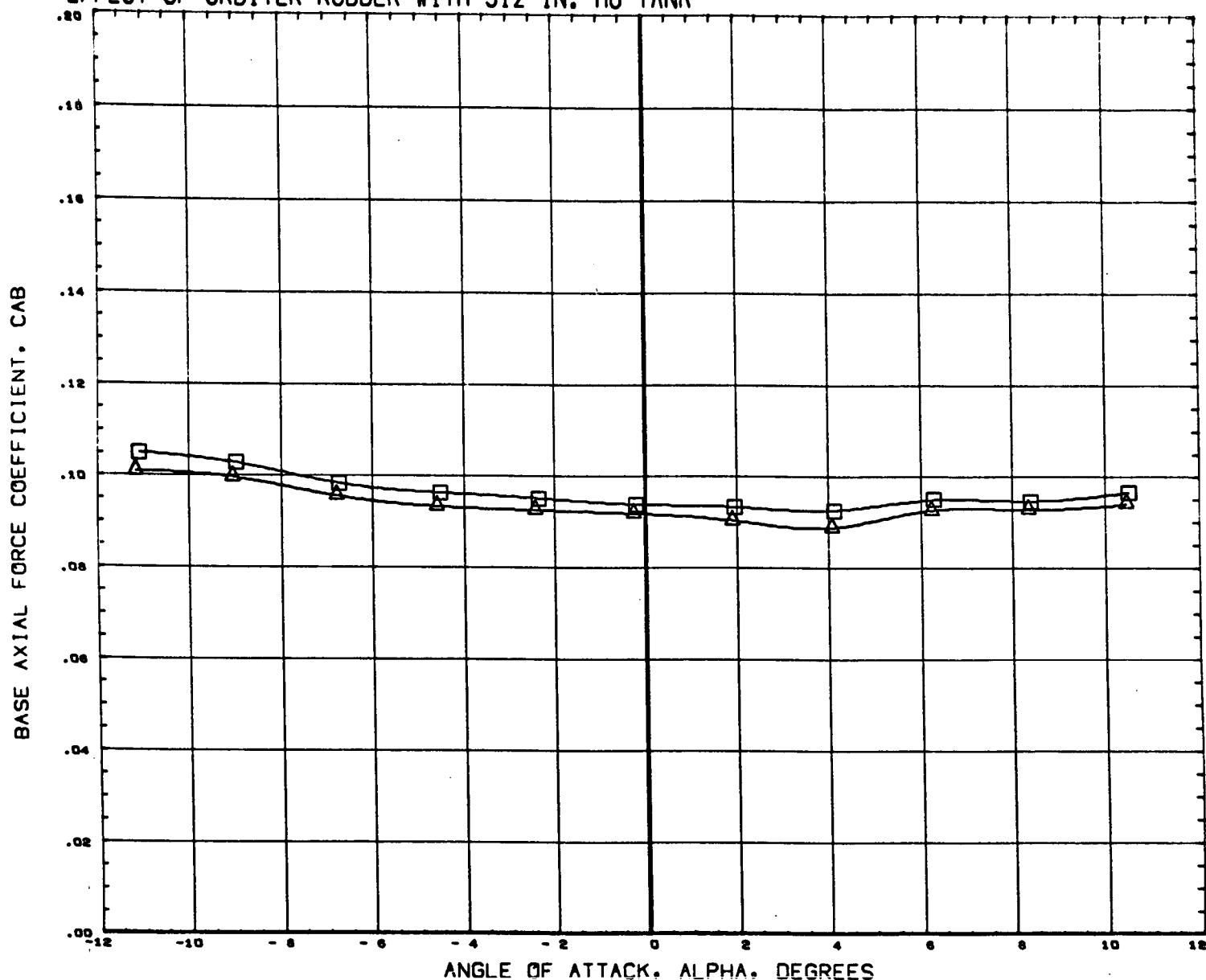
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.20

PAGE 529

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



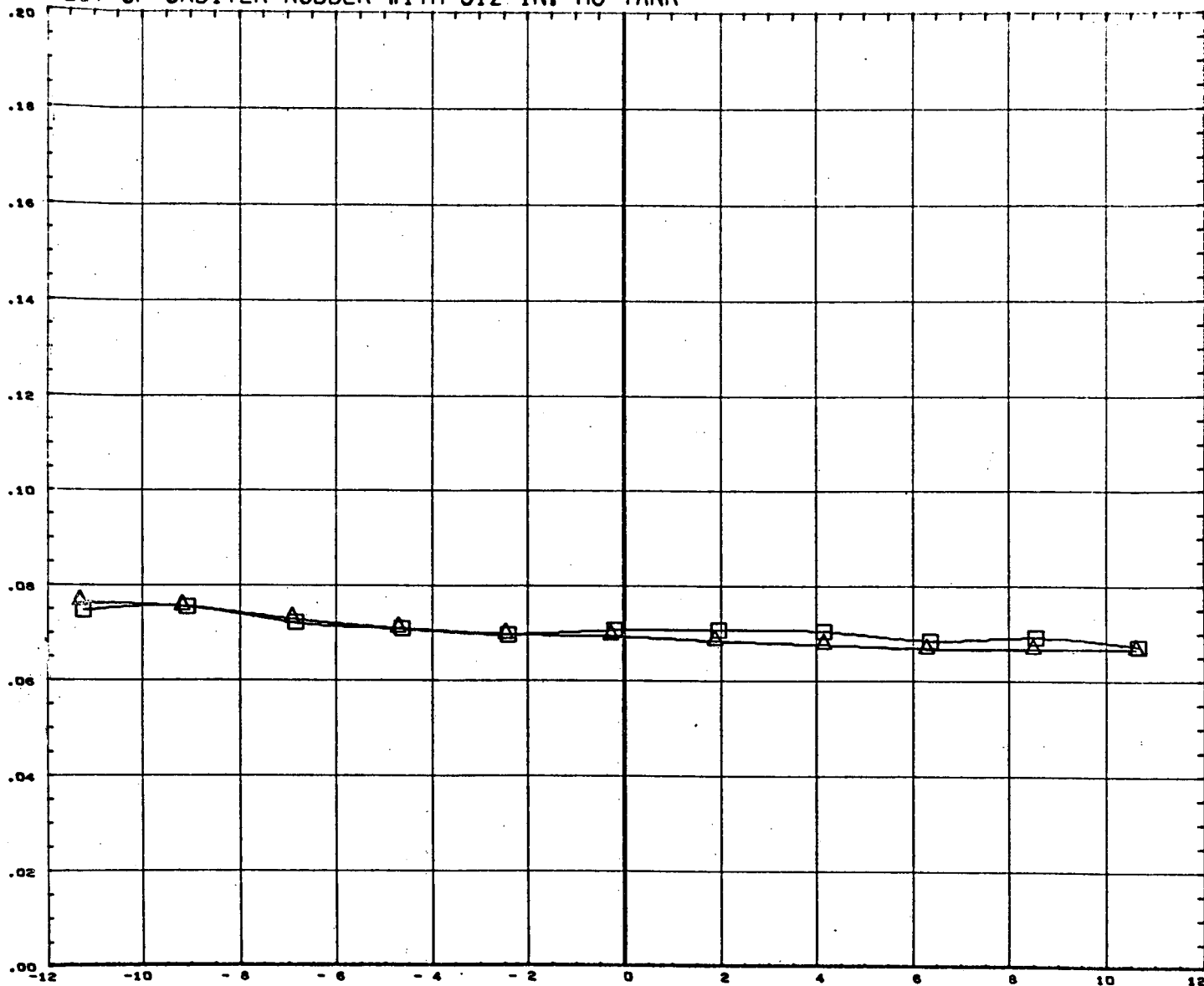
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|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

BASE AXIAL FORCE COEFFICIENT, C_{AB}



ANGLE OF ATTACK, ALPHA, DEGREES

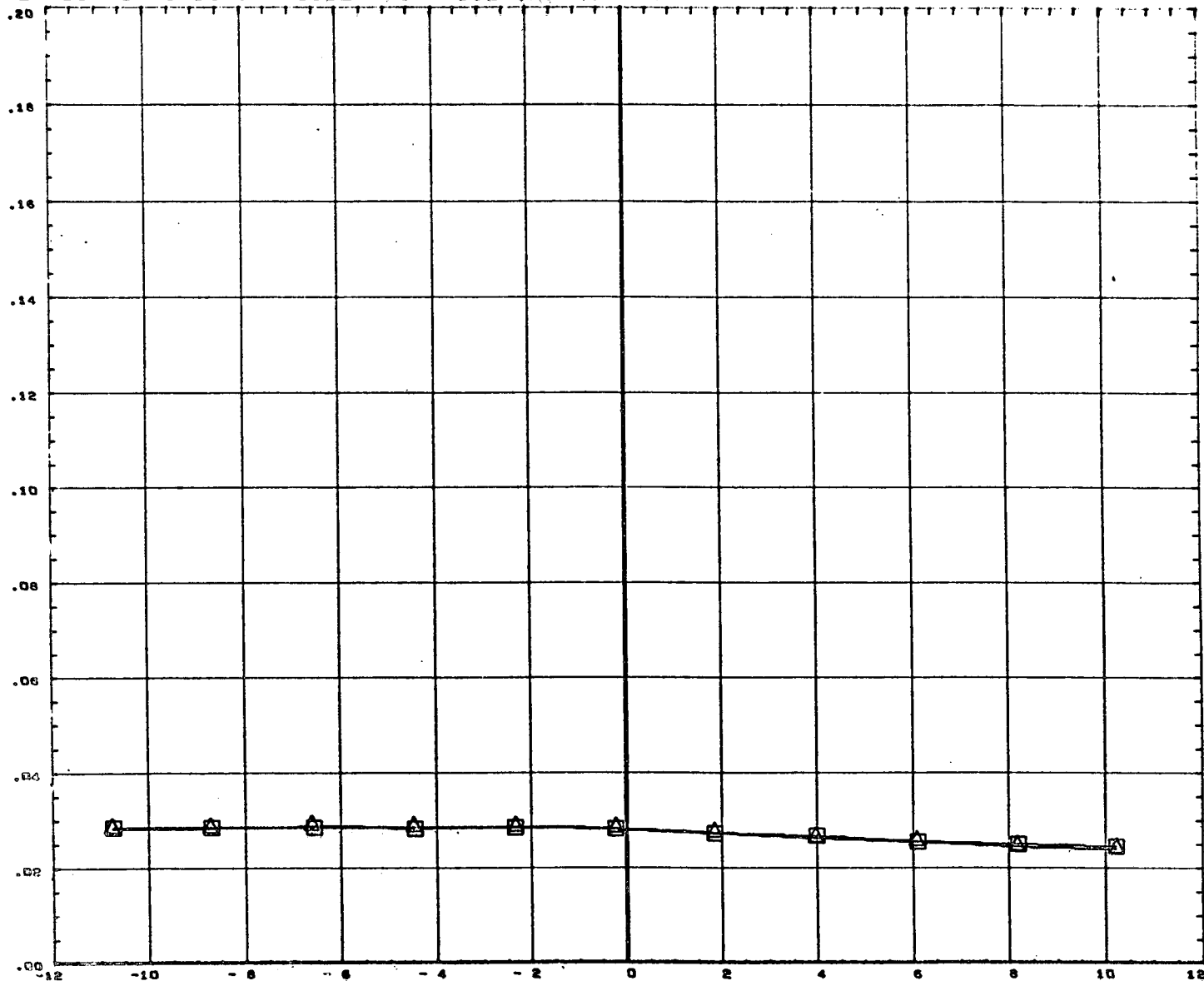
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

BASE AXIAL FORCE COEFFICIENT, C_{AB}



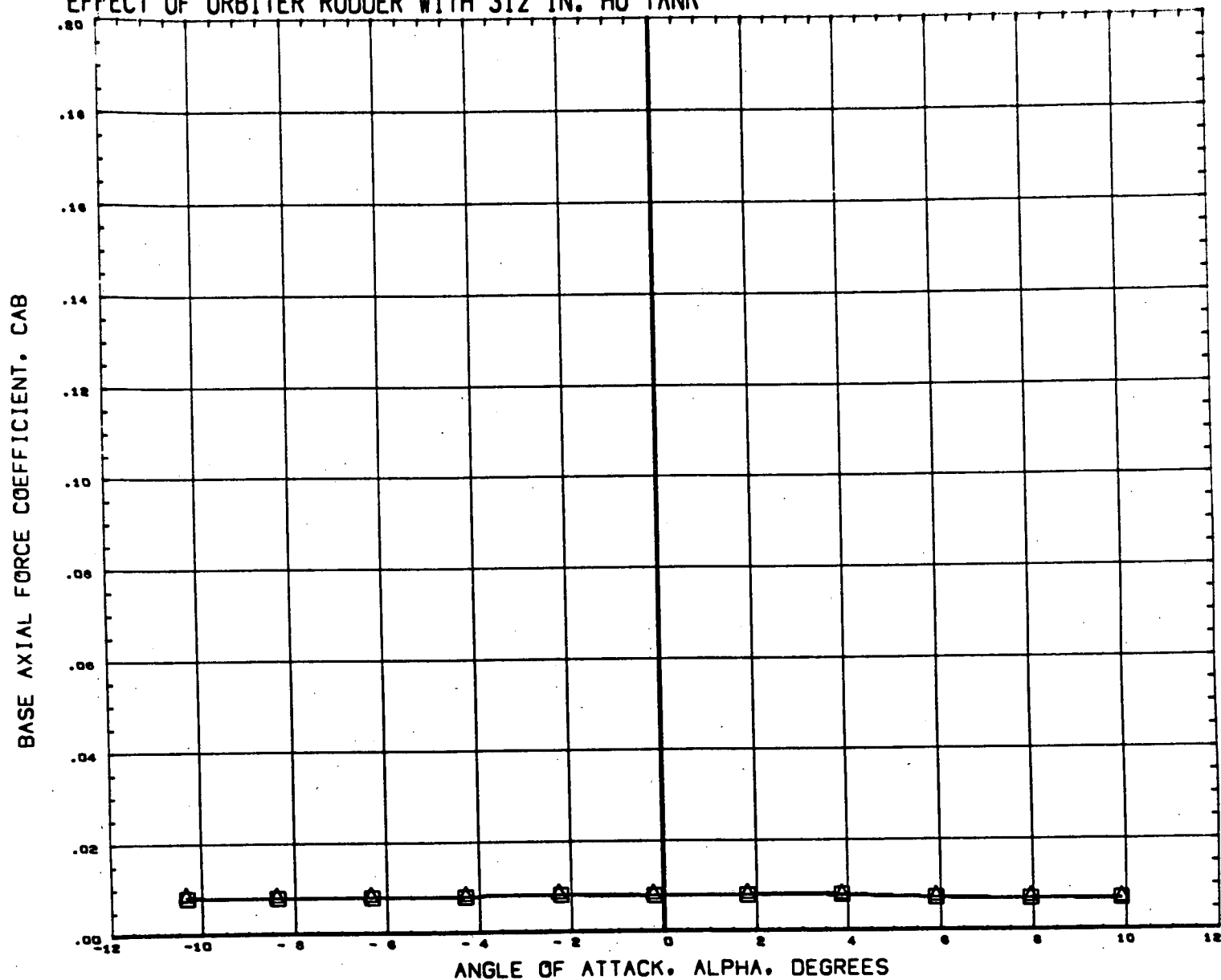
ANGLE OF ATTACK, ALPHA, DEGREES

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK

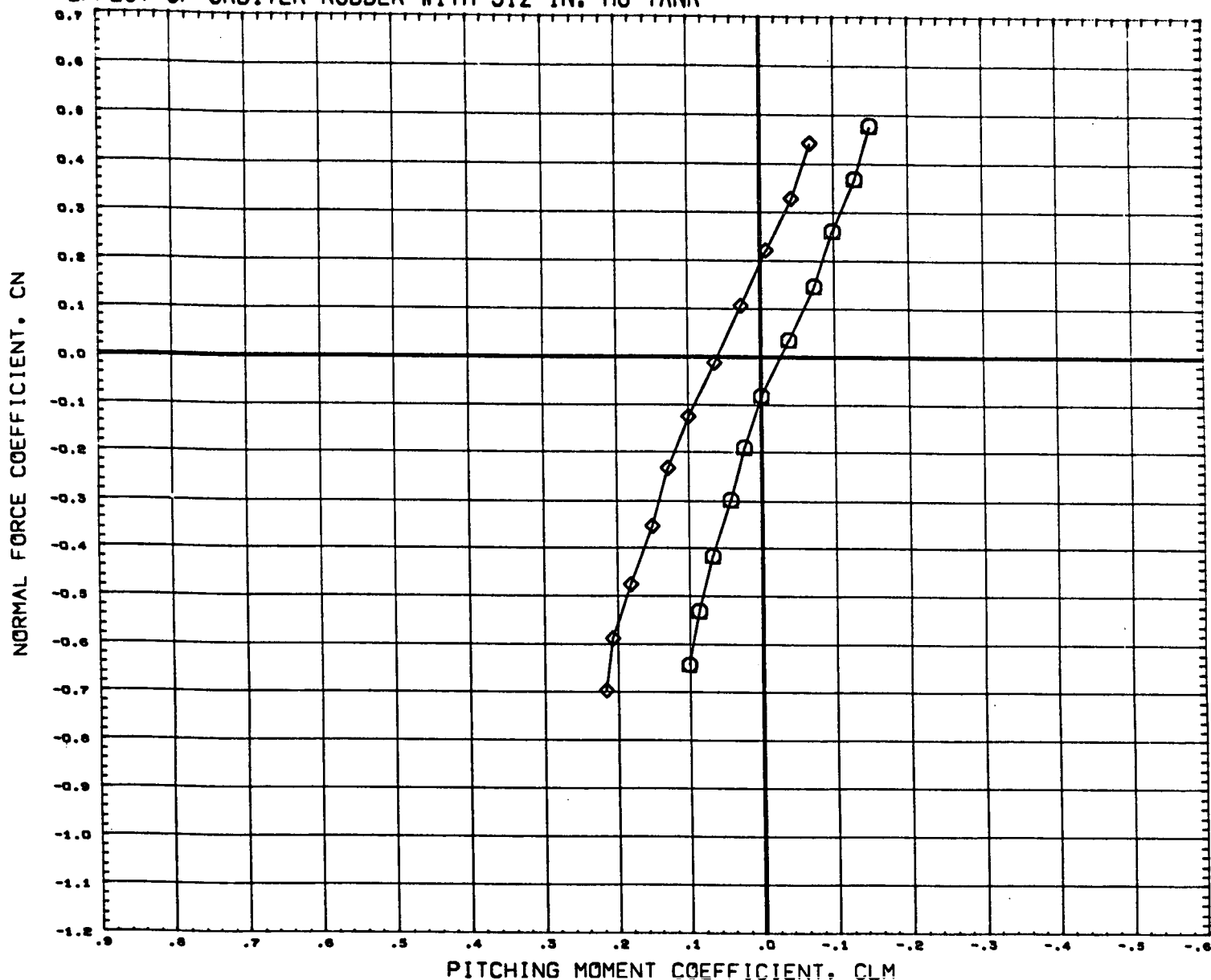


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|---------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

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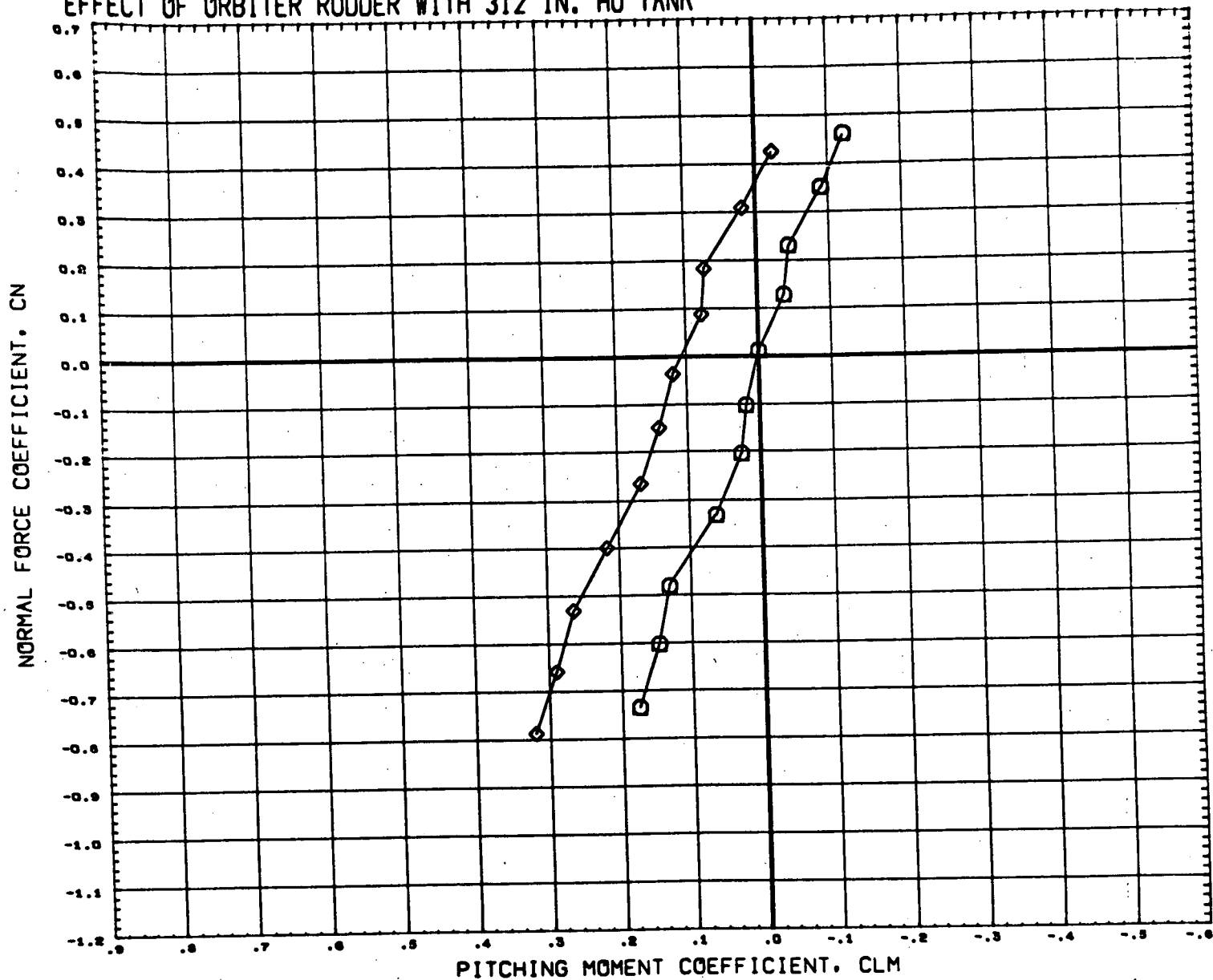
EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

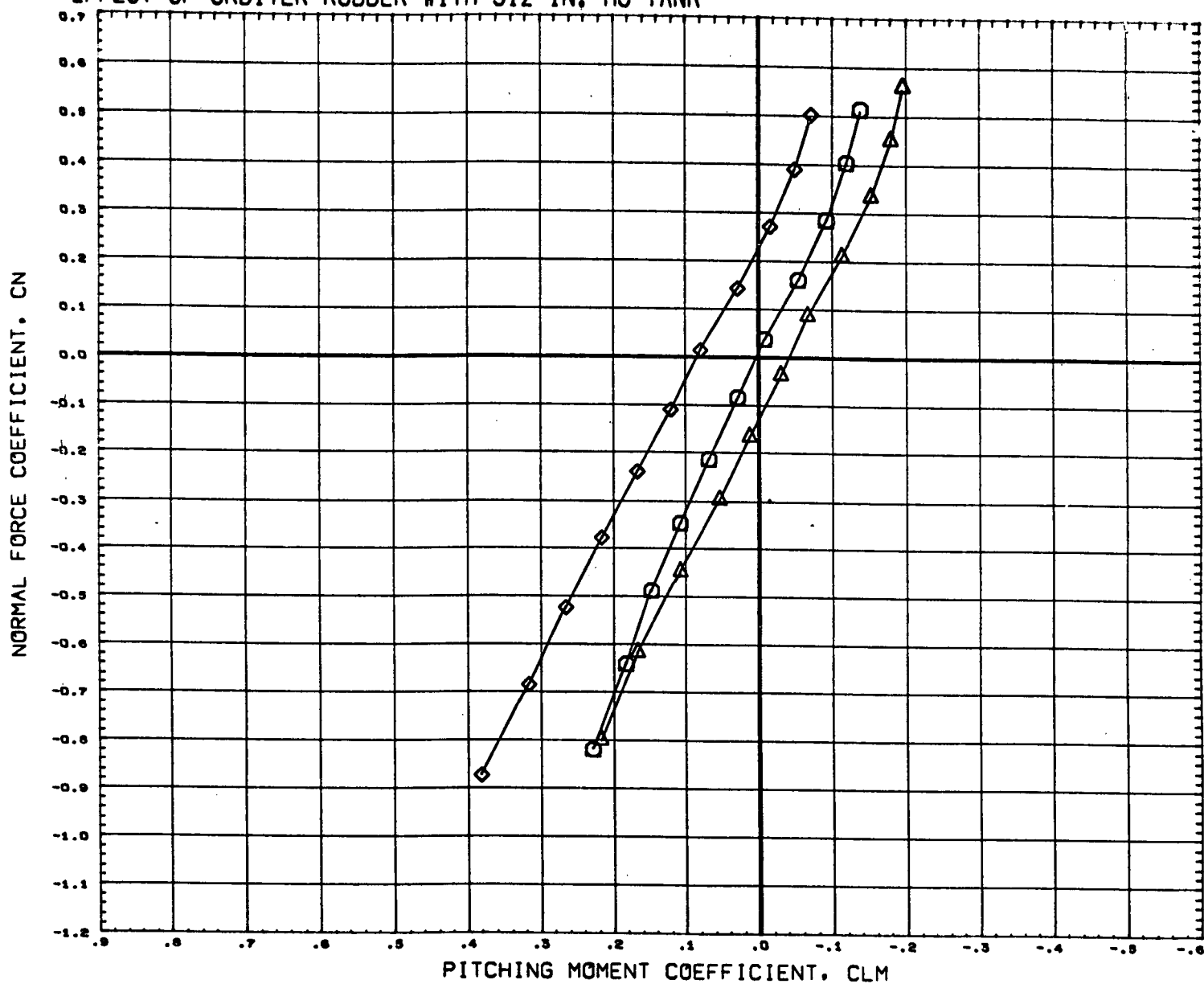


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITAL | Y5 | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---|---------|-------|--------|--------|-----------------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.6800 SQ. IN. |
| (071133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 30.000 | BREF 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP 3.3600 IN. |
| | | | | | | YMRP 0.0000 IN. |
| | | | | | | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH .90

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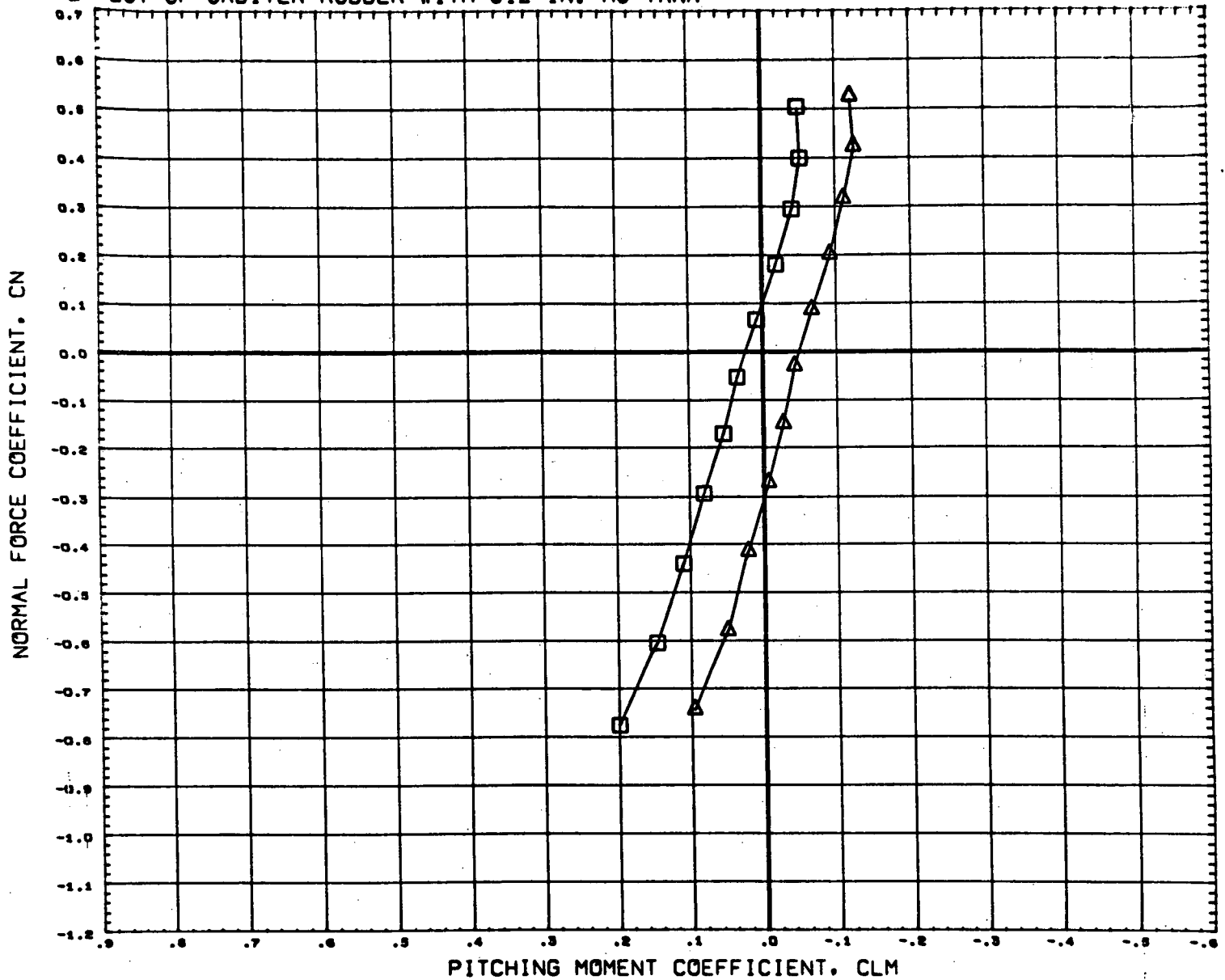
EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4800 IN. |
| (871139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

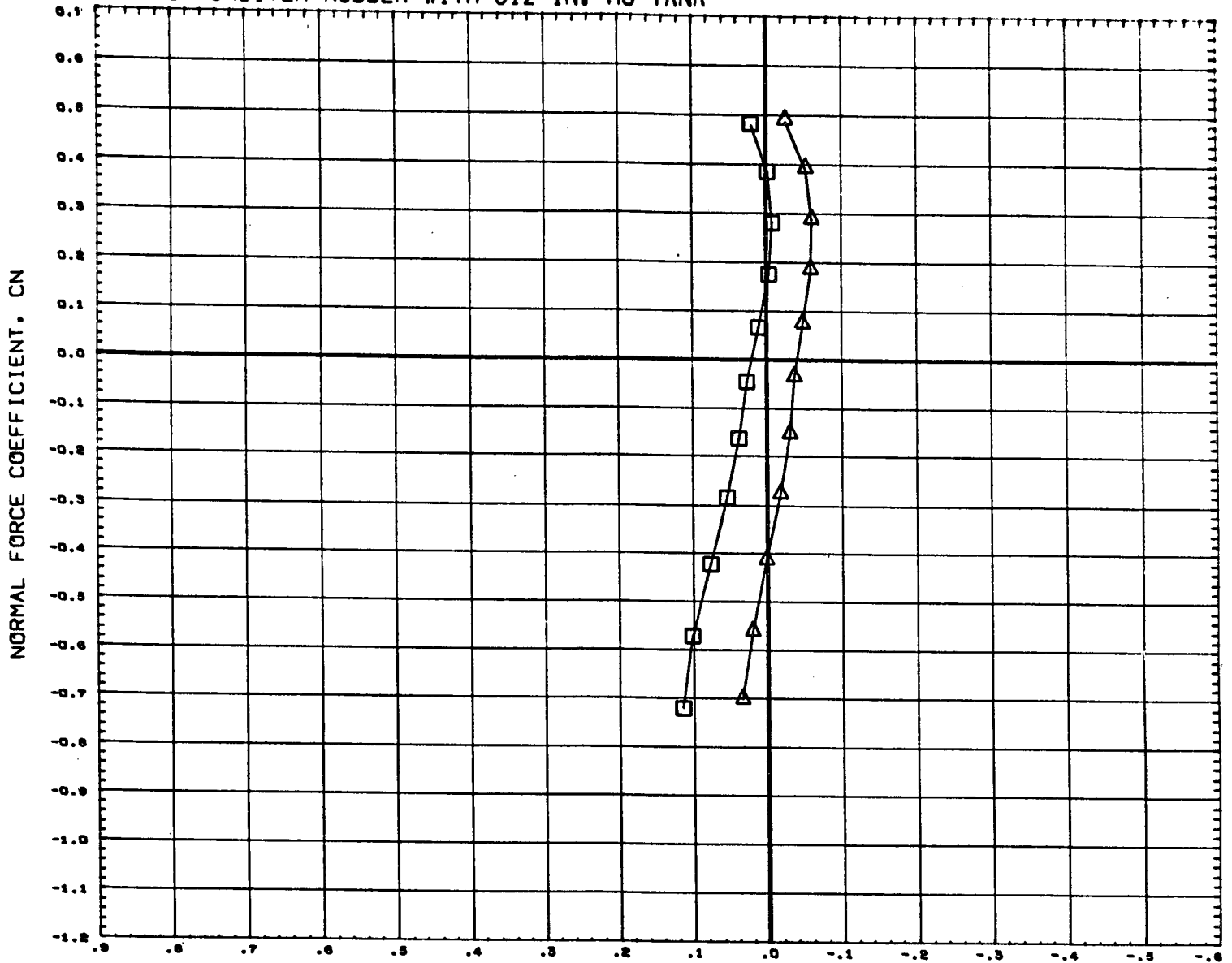


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6600 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



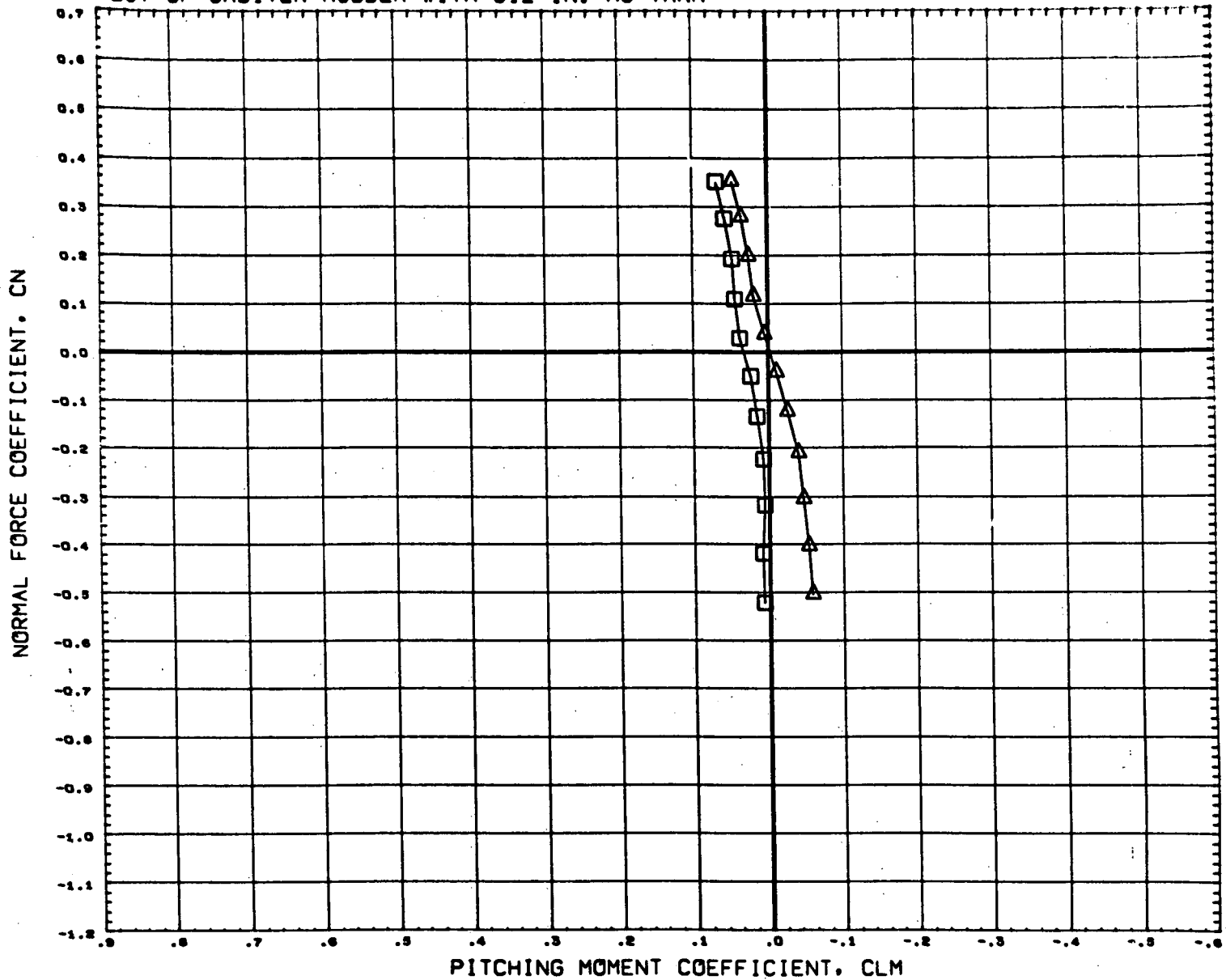
PITCHING MOMENT COEFFICIENT, CLM

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (871139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

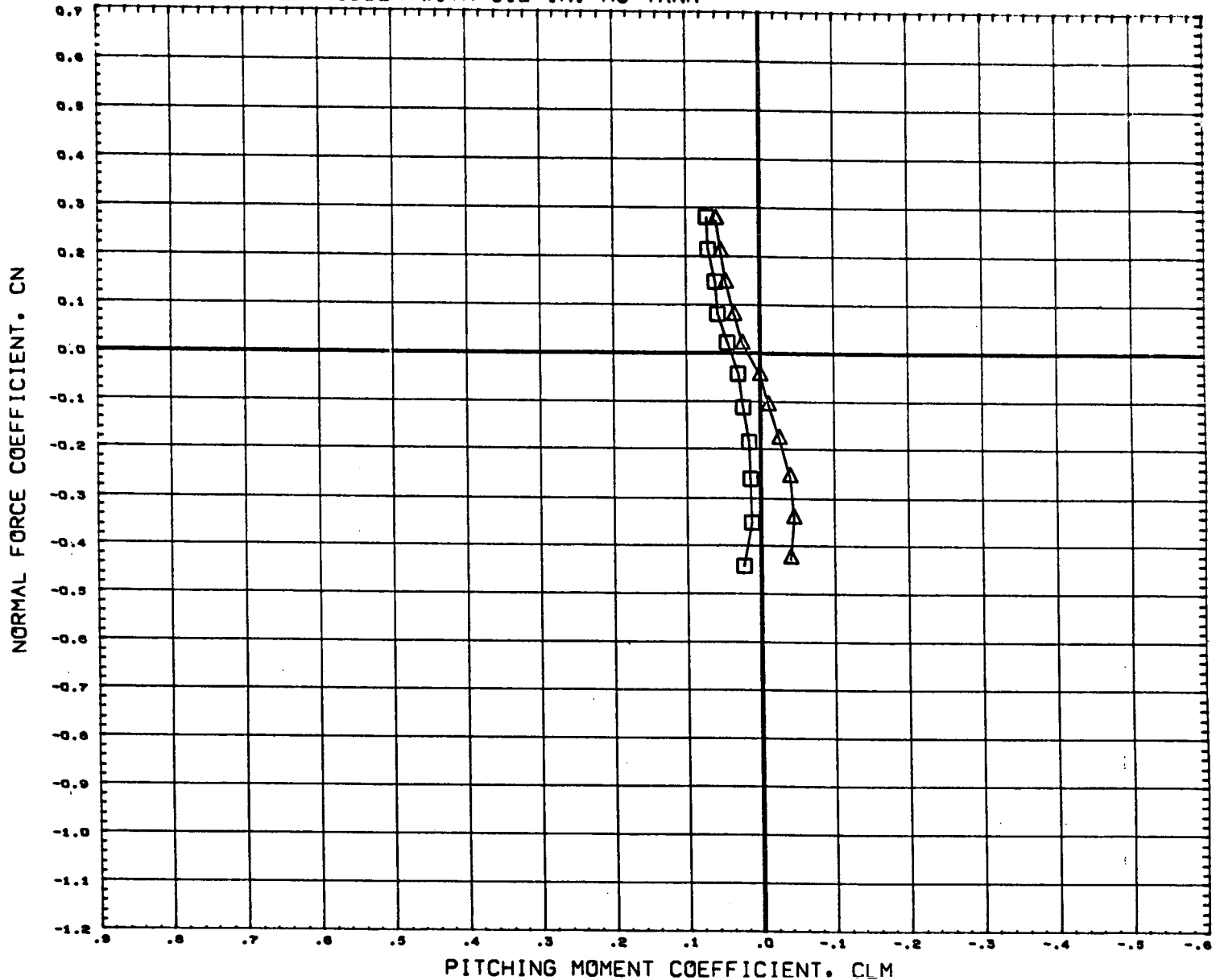


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 30. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

PAGE 539

EFFECT OF ORBITER RUDDER WITH 312 IN. H₂ TANK

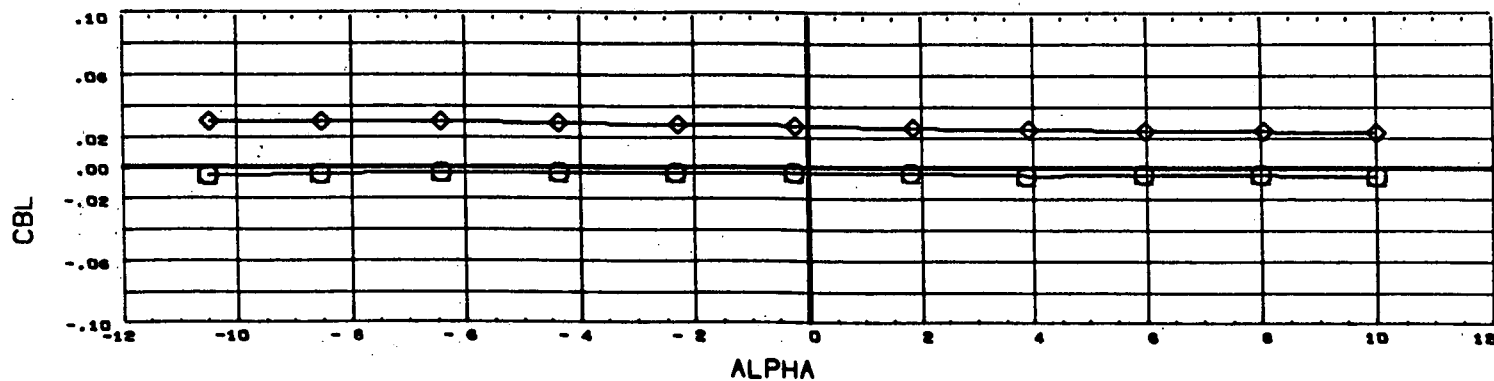
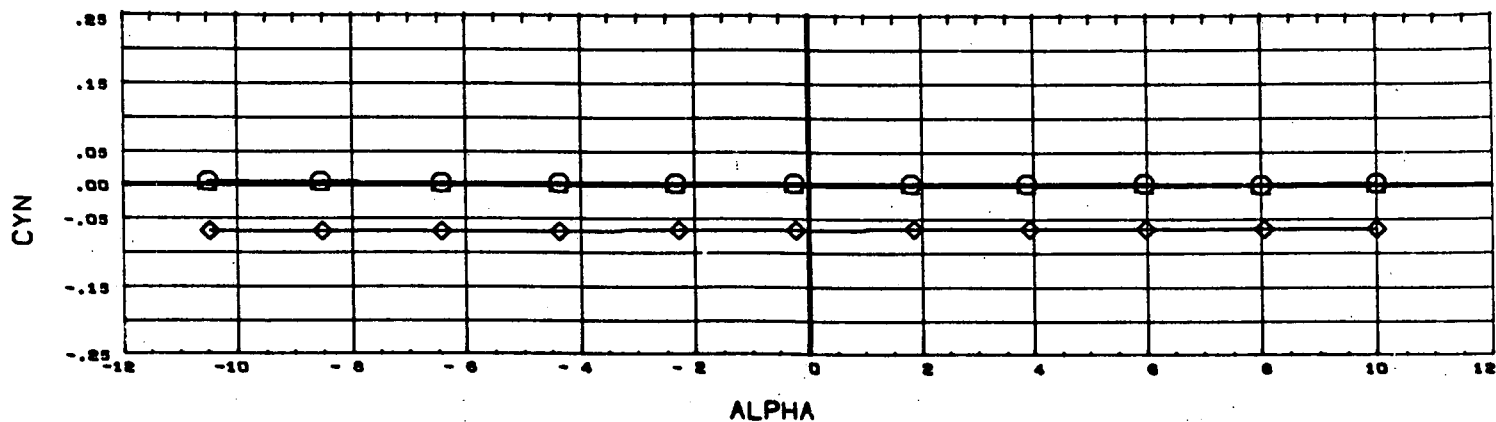
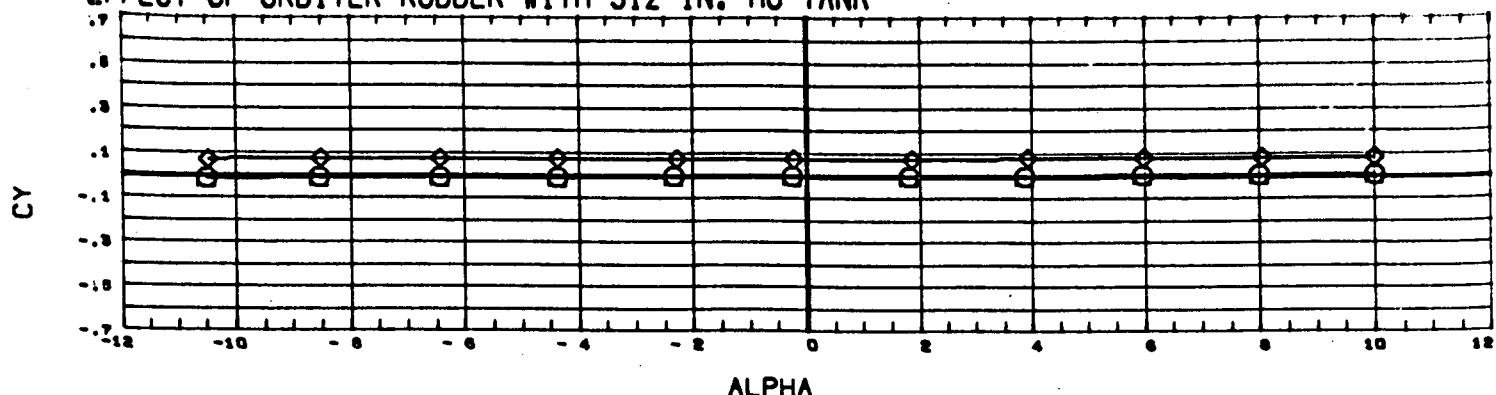


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | | |
|-----------------|---|--------|-------|--------|--------|-----------------------|--------|---------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 | SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 | IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 | IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 | IN. |
| | | | | | | YMRP | 0.0000 | IN. |
| | | | | | | ZMRP | 0.2480 | IN. |
| | | | | | | SCALE | 0.0040 | SCALE |

MACH 4.96

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EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

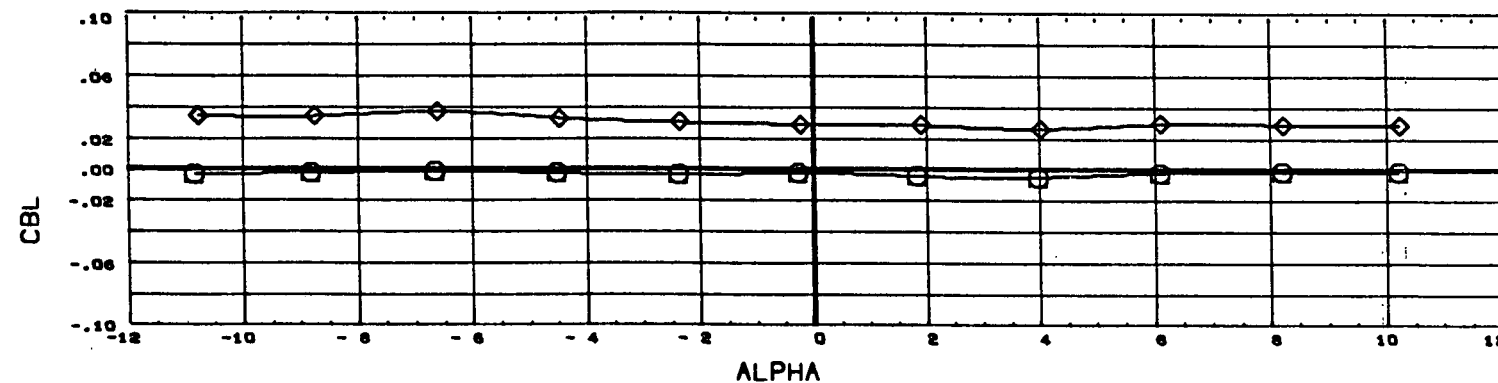
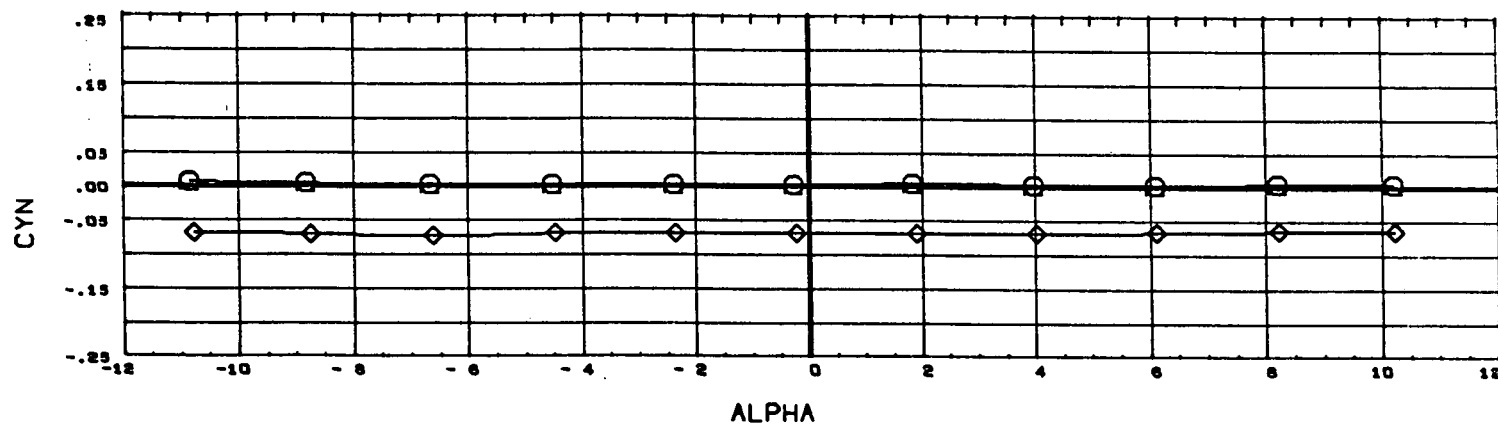
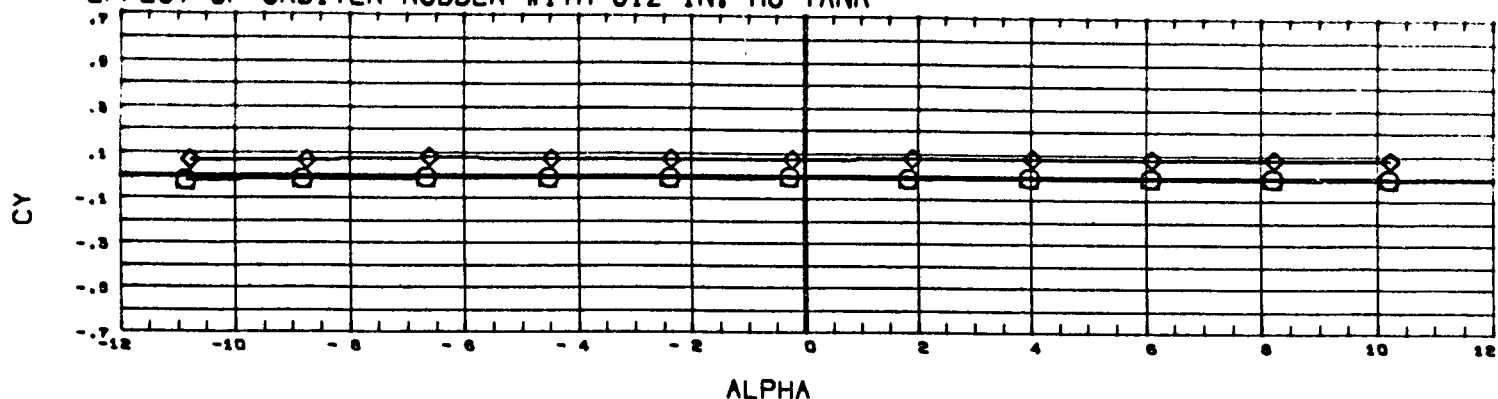


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (D71135) | MSFC TWT 944X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (B71137) | MSFC TWT 944X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2400 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .60

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

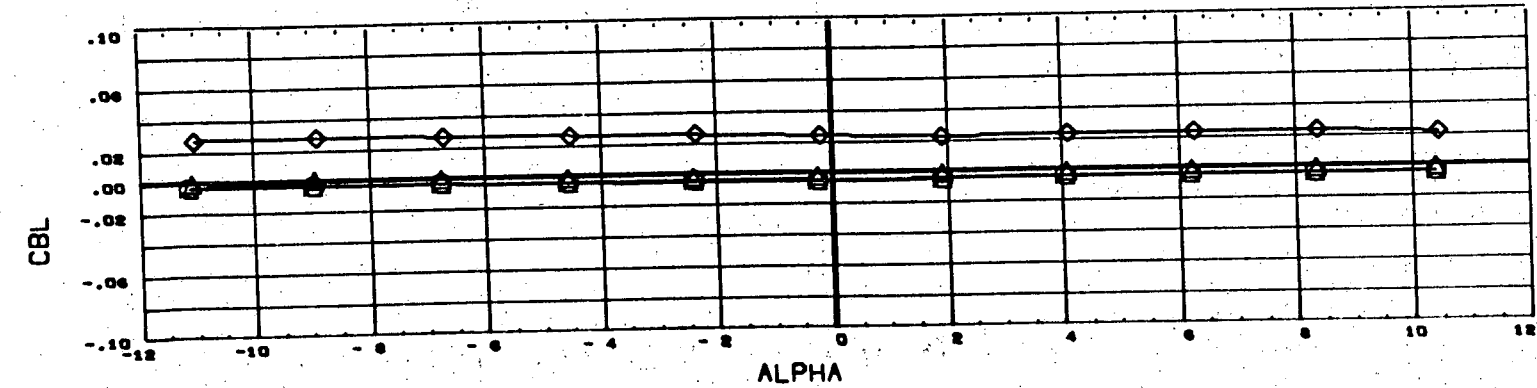
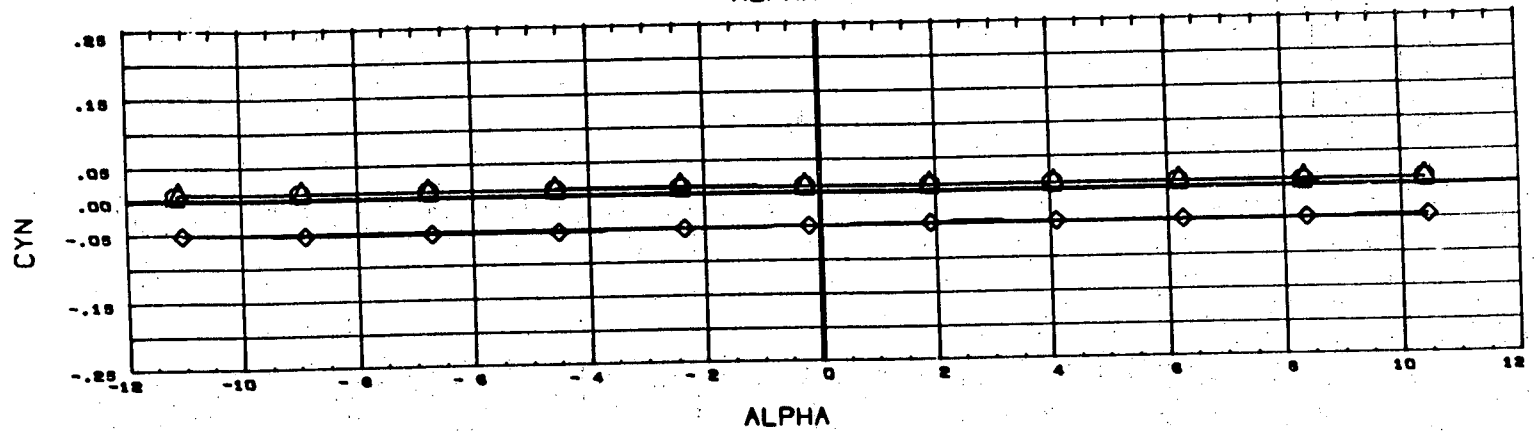
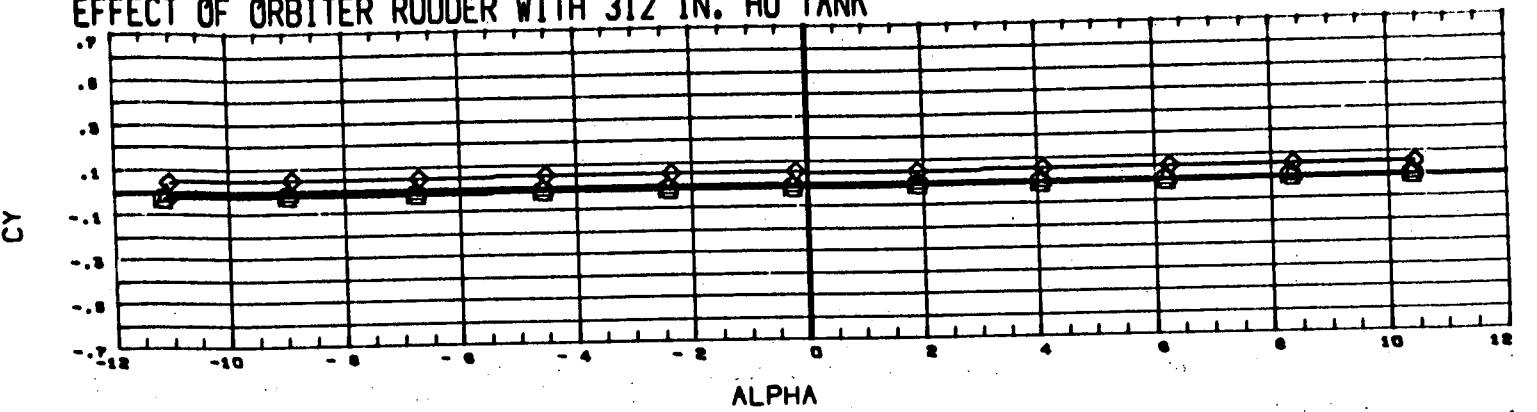


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (871133) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (871137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (871139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRF | 3.3600 IN. |
| | | | | | | YMRF | 0.0000 IN. |
| | | | | | | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .90

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EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

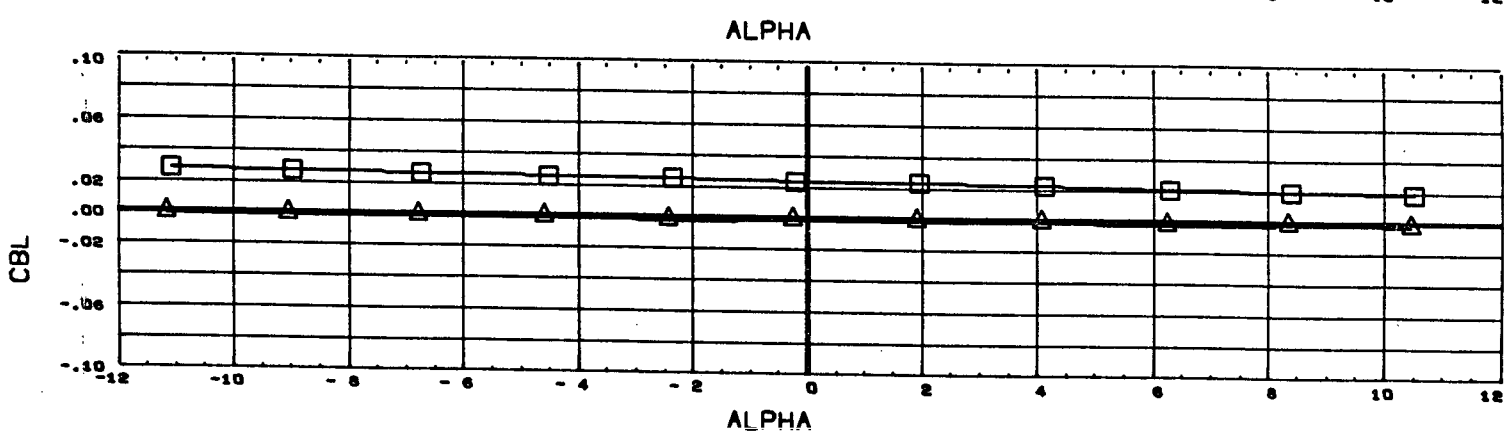
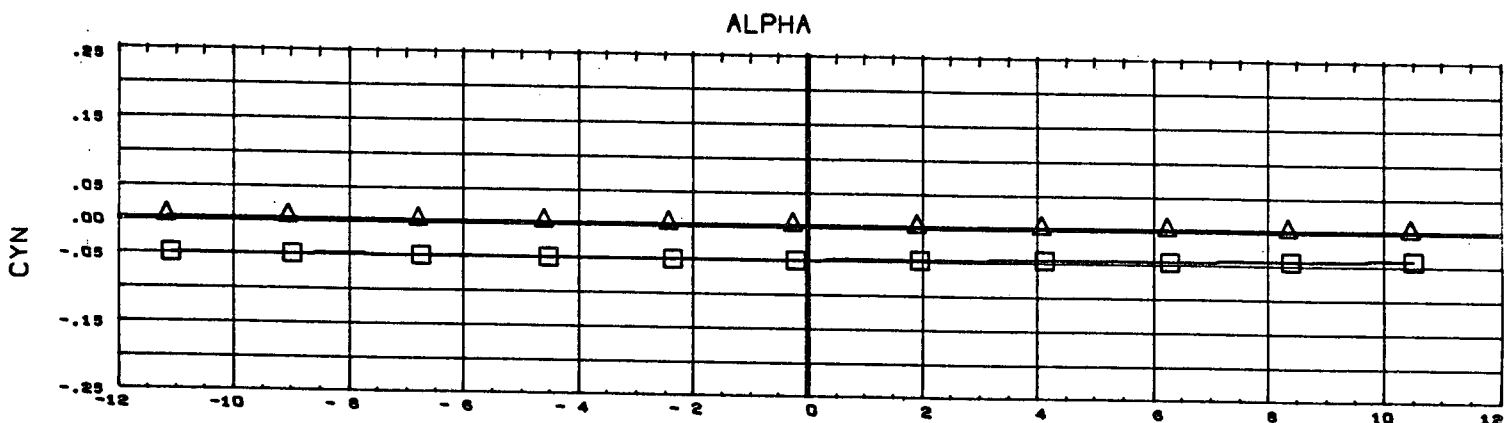
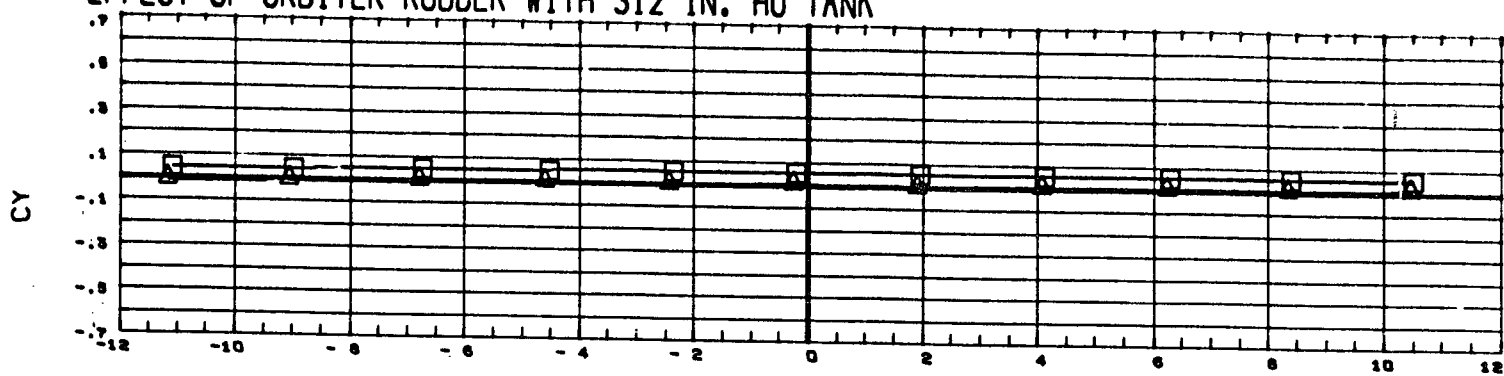


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6900 SQ. IN. |
| (071135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LRFP | 2.0260 IN. |
| (071137) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 30.000 | BRFP | 4.4600 IN. |
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | YMRP | 3.3600 IN. |
| | | | | | | ZMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.20

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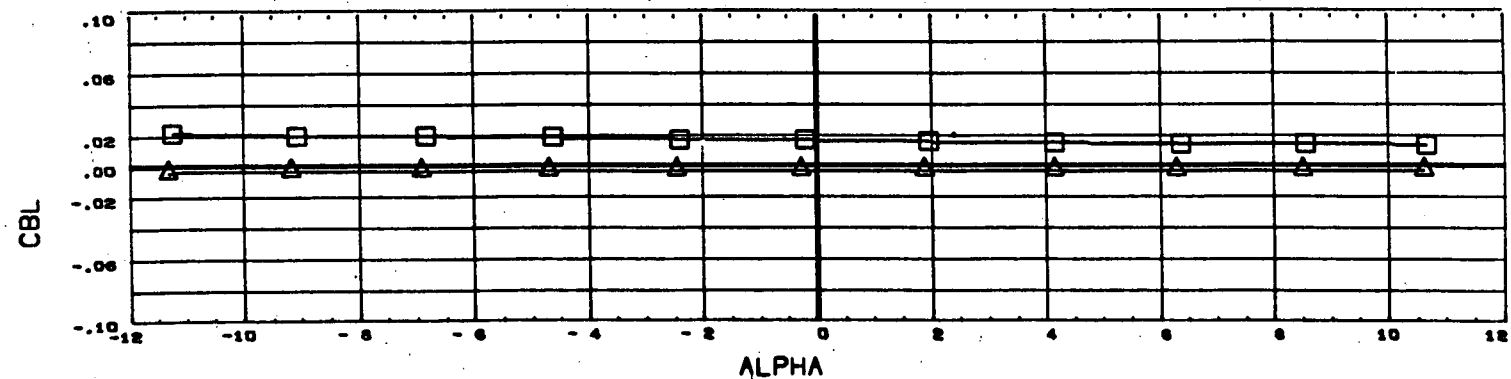
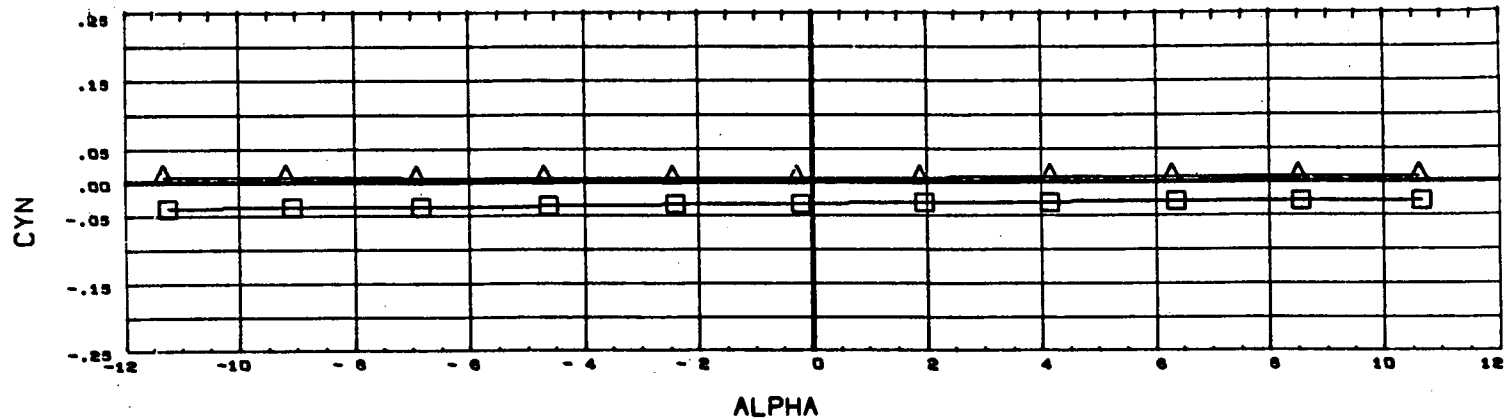
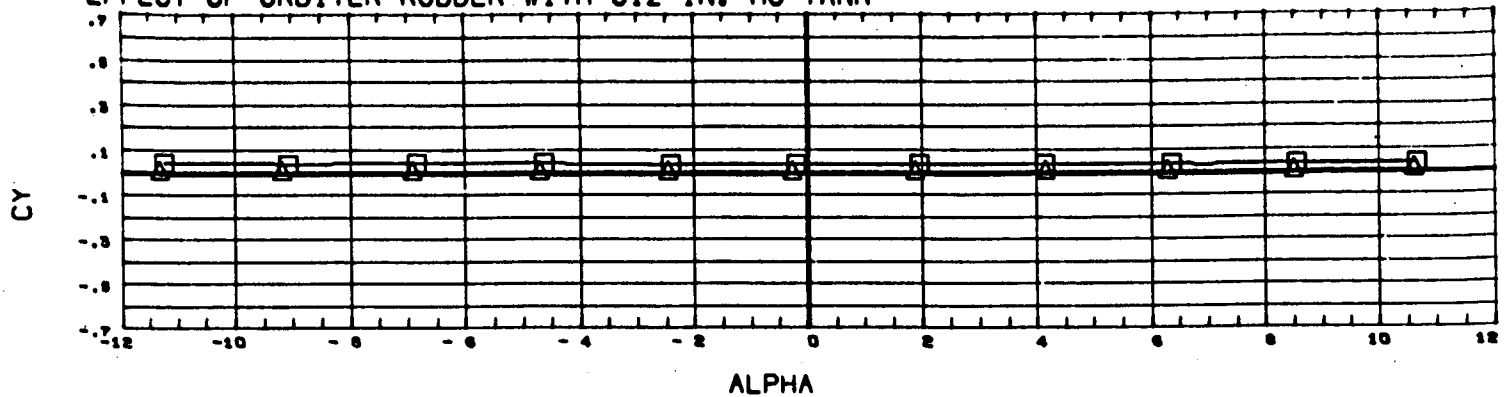
EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (D71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (B71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (B71137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (B71139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.46

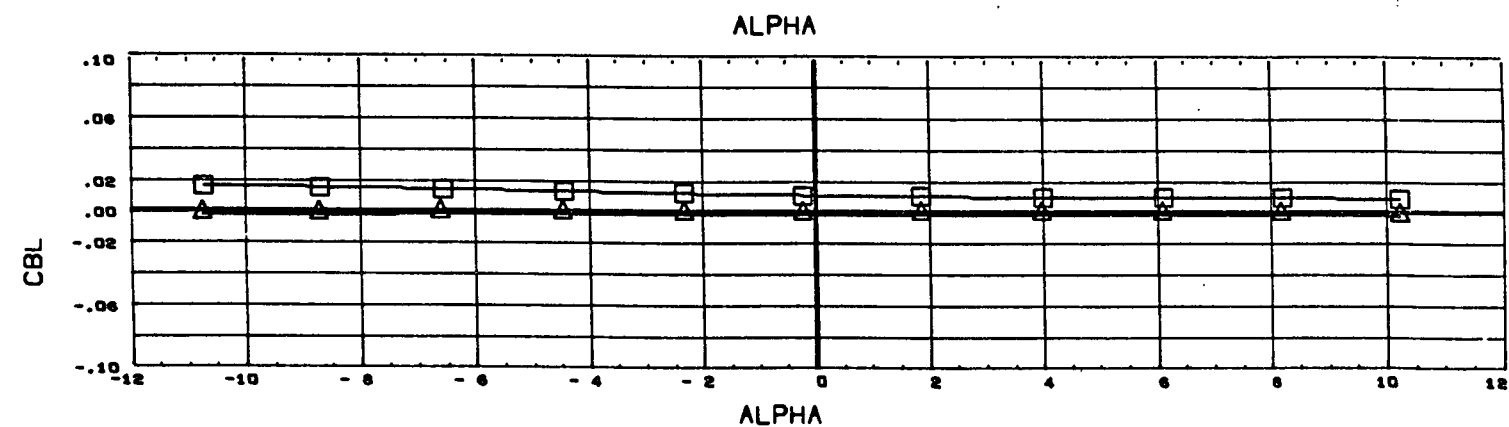
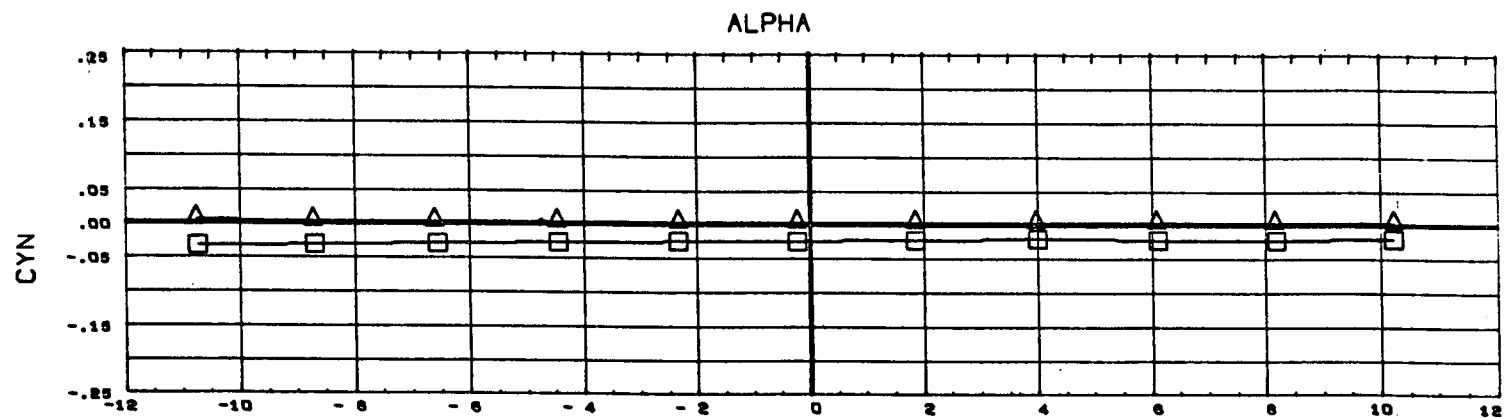
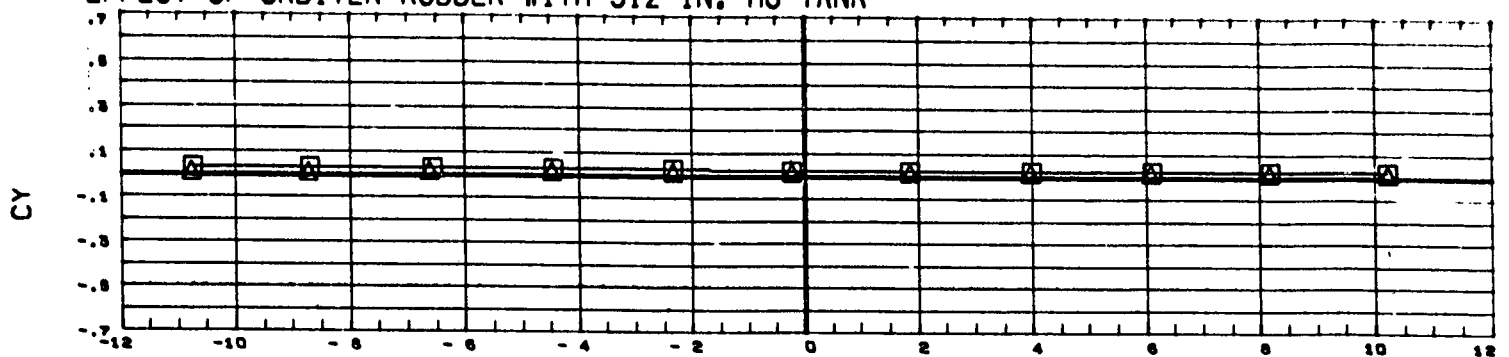
EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071139) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6800 30. IN. |
| (071133) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREP | 4.4600 IN. |
| (071139) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.95

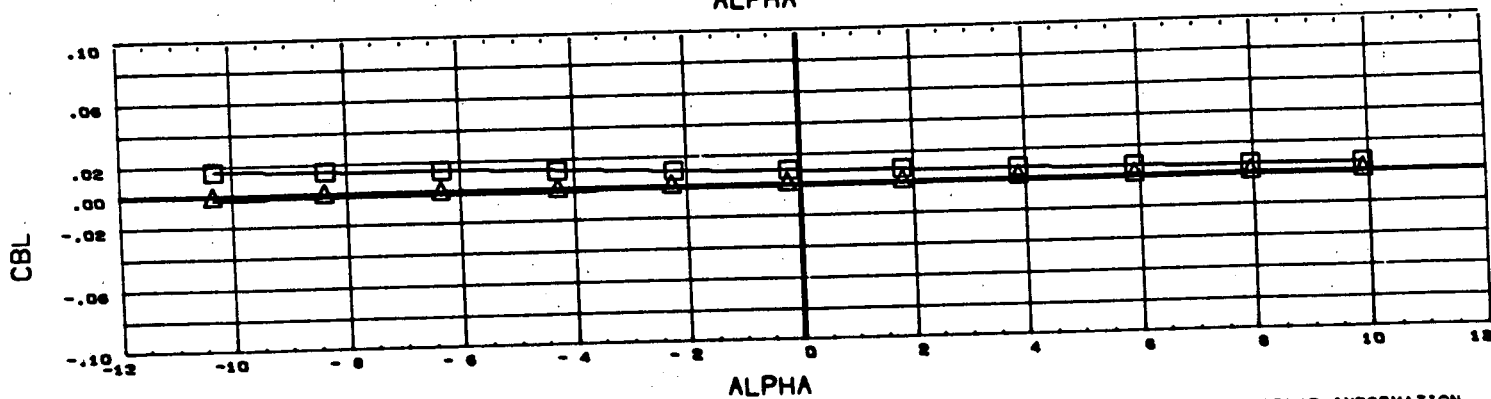
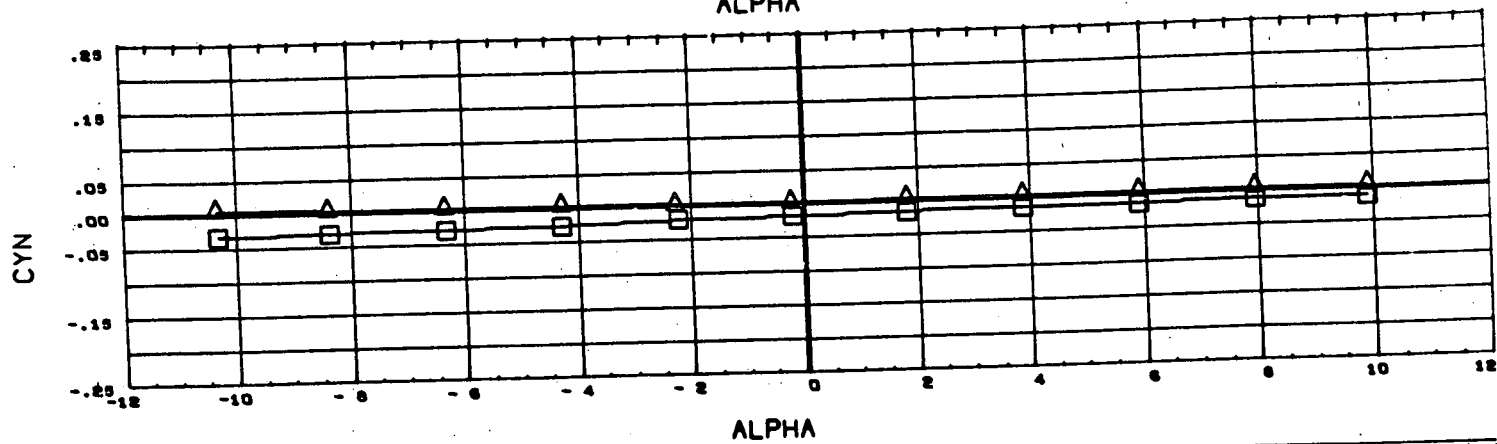
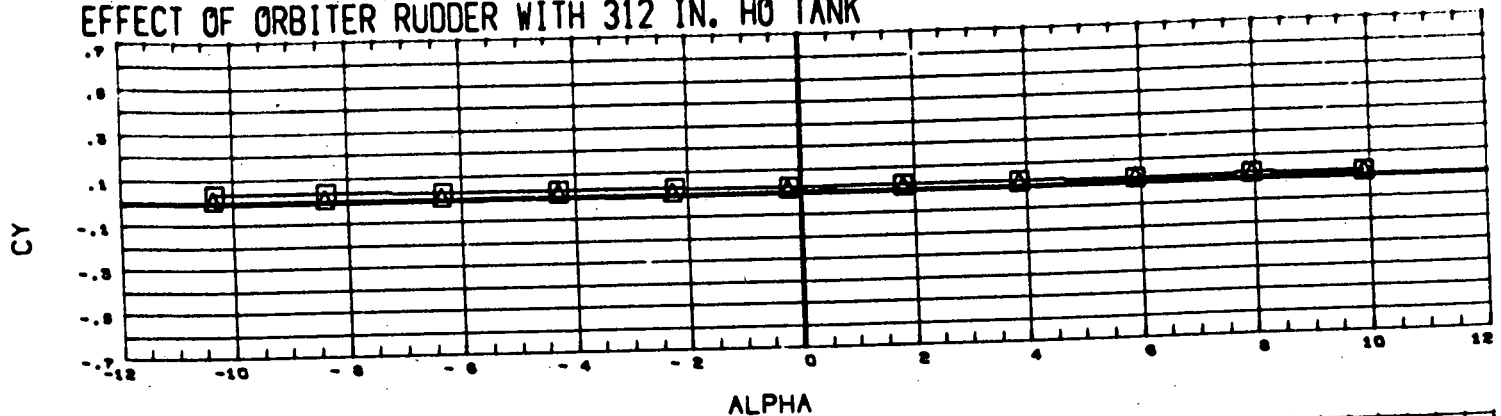
EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (071135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (071133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (071137) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (071139) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



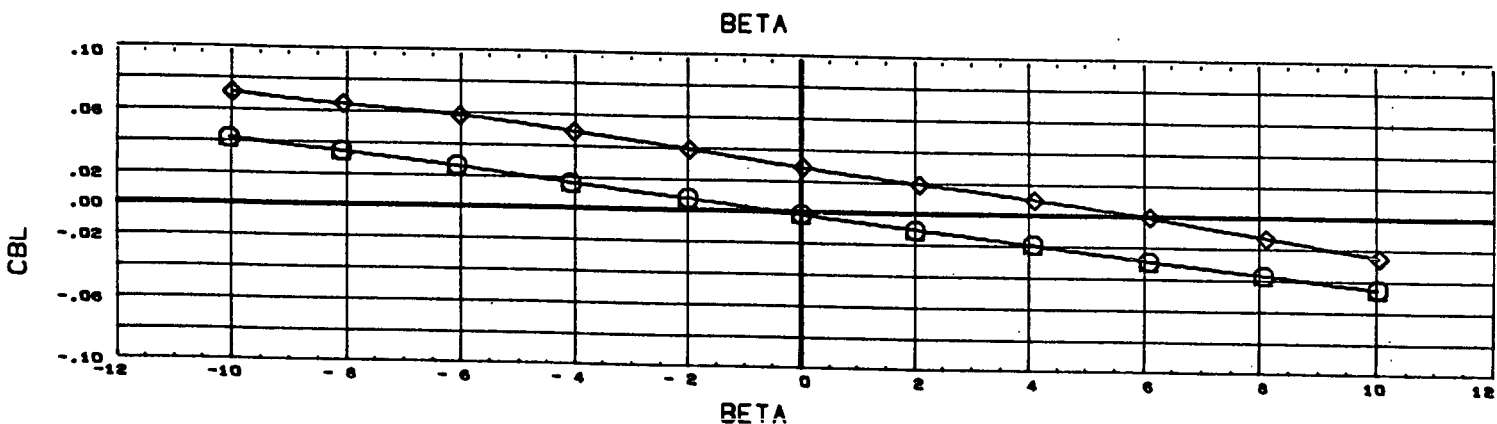
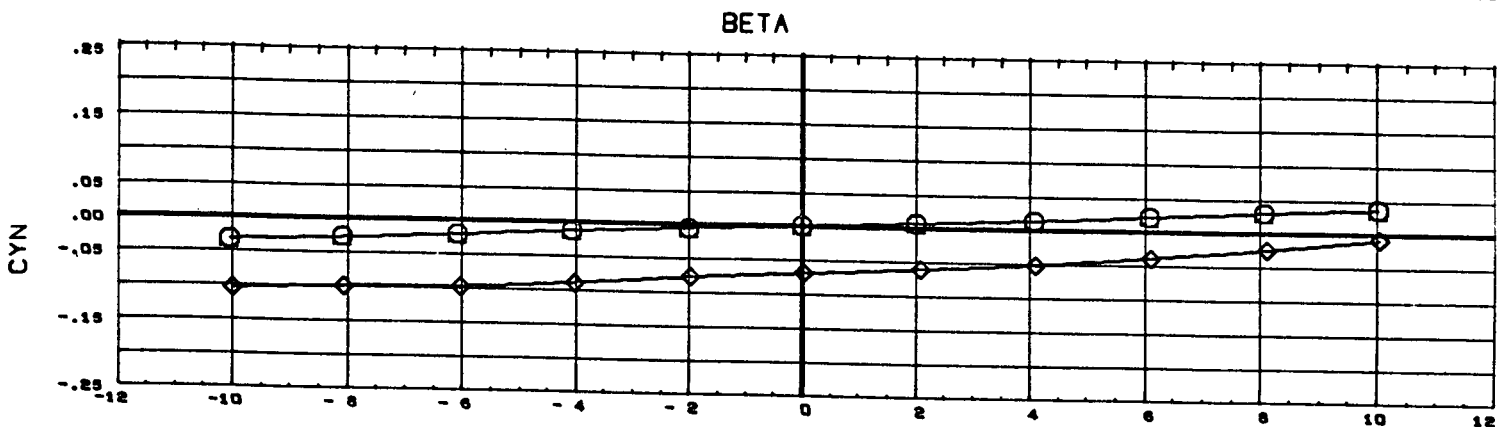
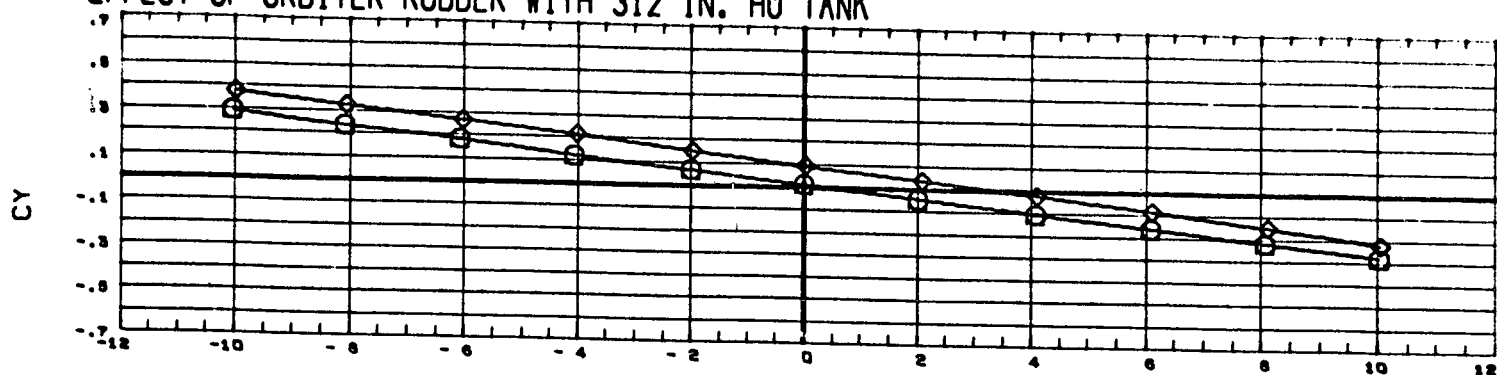
DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (071135) DATA NOT AVAILABLE FOR ALL CONDITIONS
 (071135) MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231
 (071137) DATA NOT AVAILABLE FOR ALL CONDITIONS
 (071139) MSFC TWT 544X LAUNCH VEHICLE STUDIES T90231

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6600 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREP | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2460 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH

4.96

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

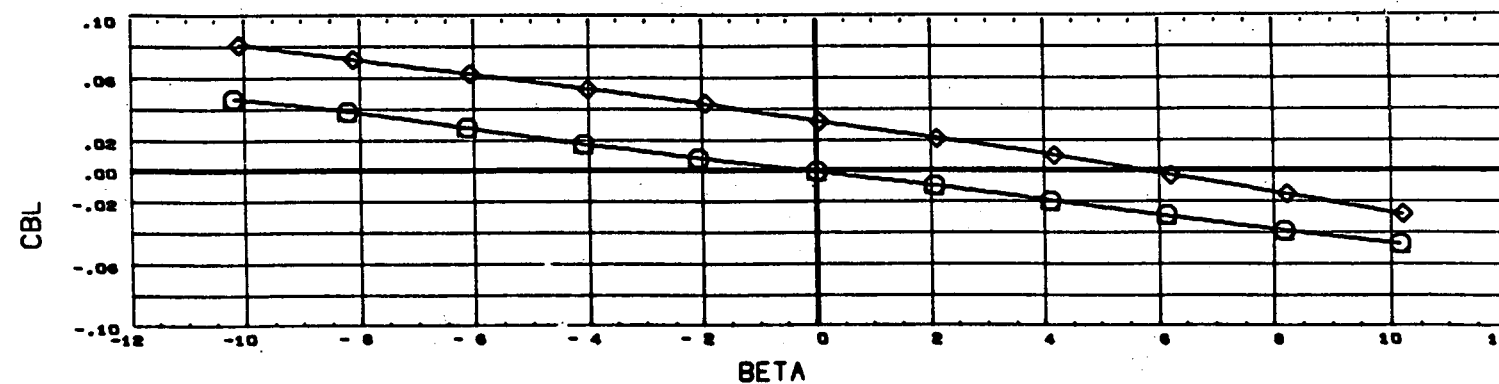
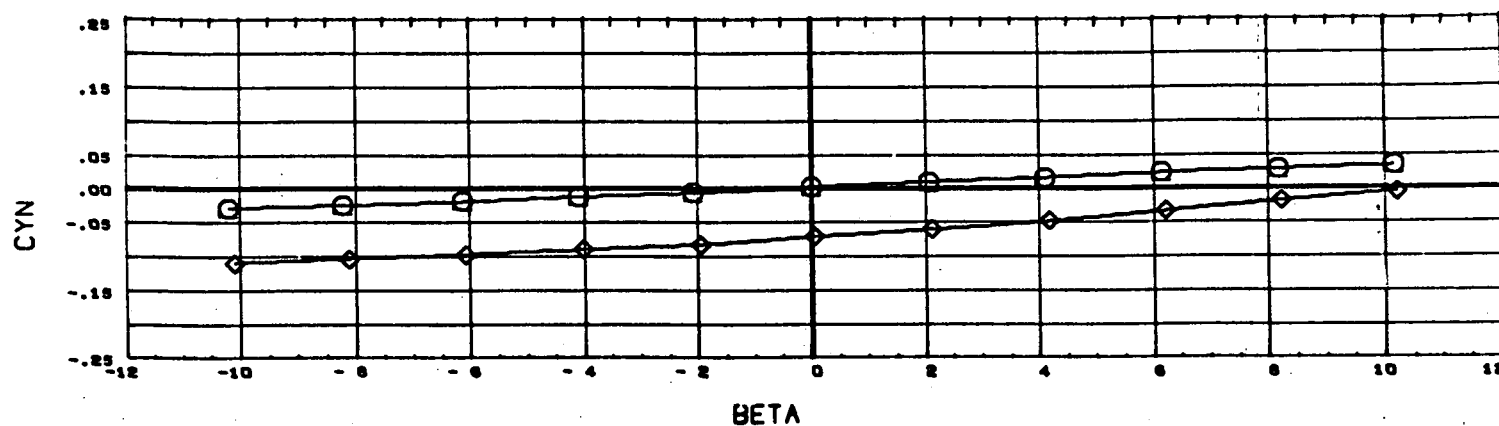
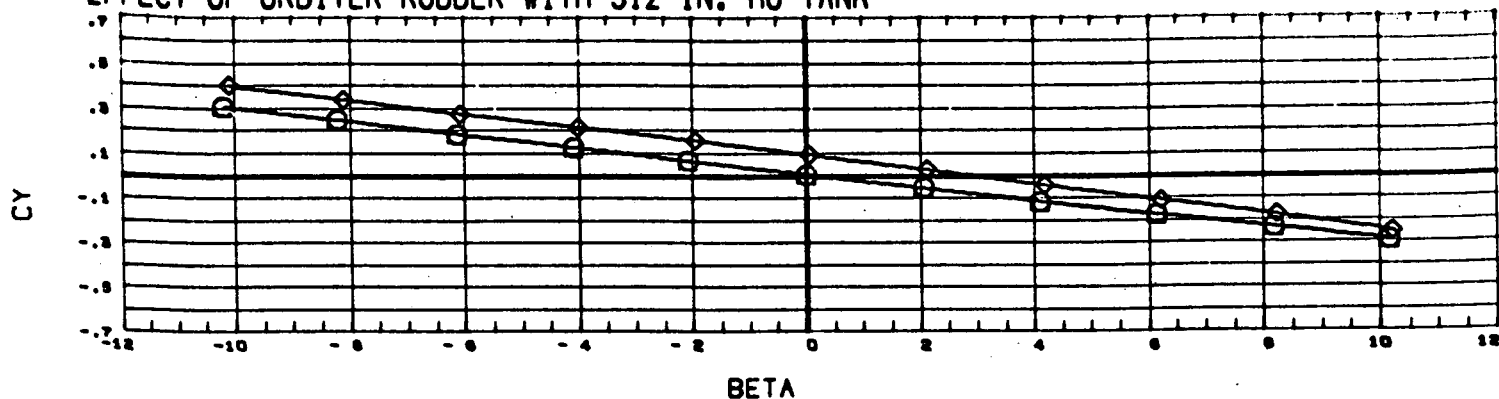


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION |
|-----------------|---|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS |
| (A71138) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 |
| (A71140) | DATA NOT AVAILABLE FOR ALL CONDITIONS |

| ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|--------|-------|--------|--------|-----------------------|----------------|
| 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | YMRP | 0.0000 IN. |
| | | | | ZMRP | 0.2480 IN. |
| | | | | SCALE | 0.0040 SCALE |

MACH .60

EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK

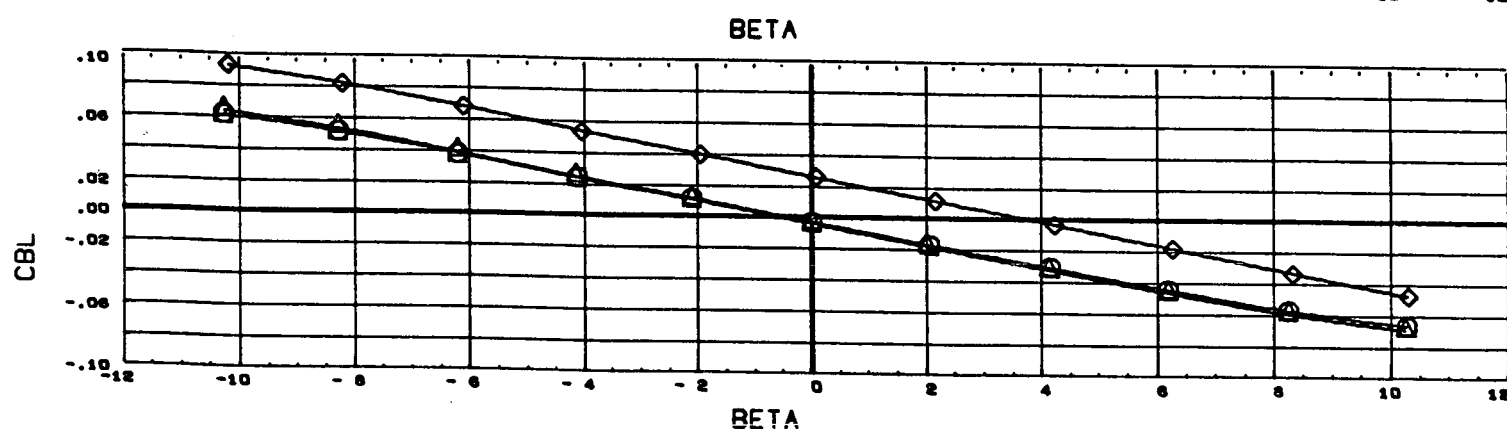
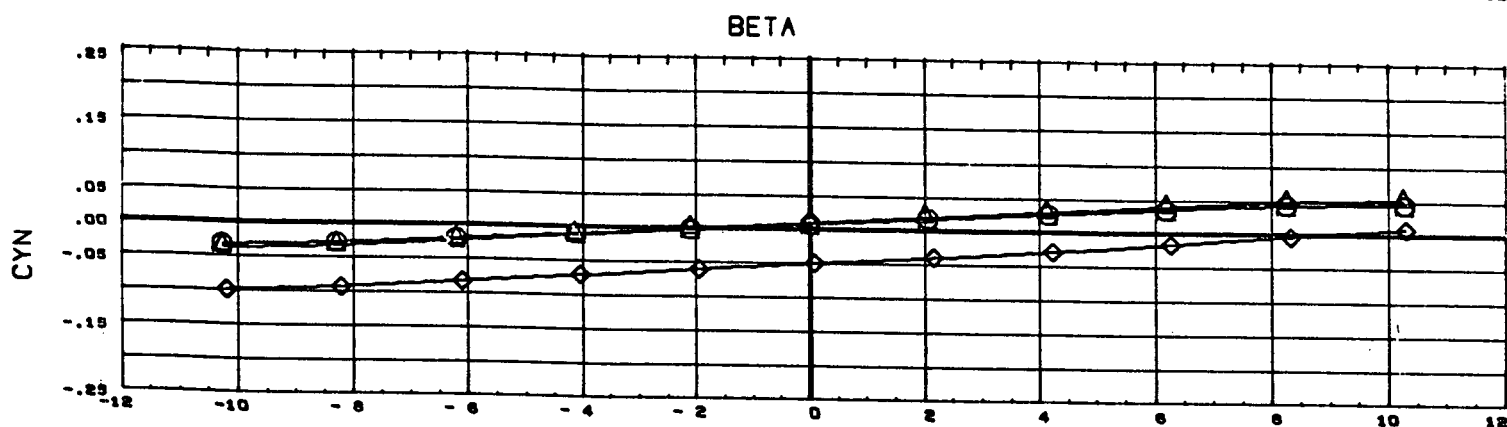
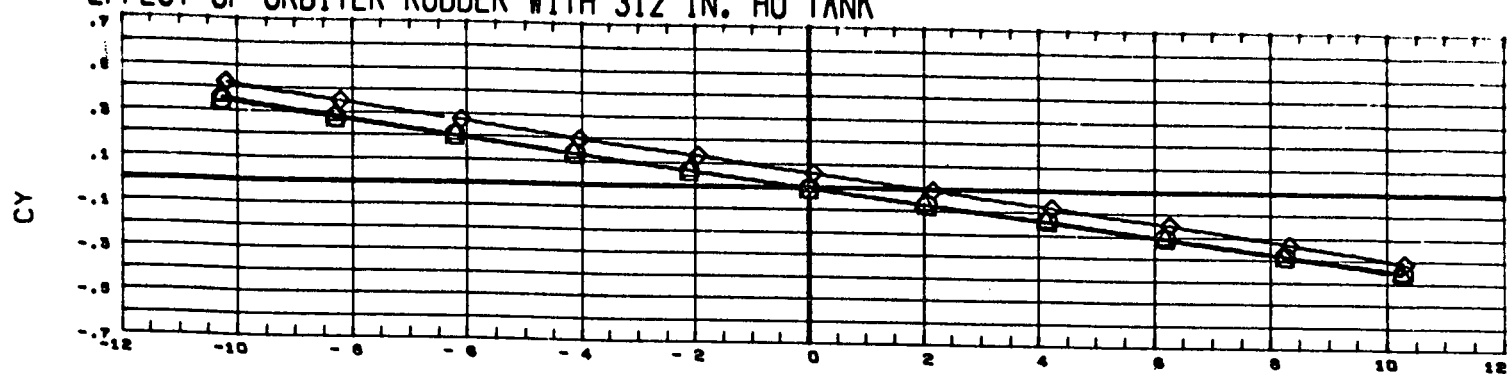


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (A71134) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T90131 | 0.000 | 0.023 | 0.000 | 30.000 | SREF | 4.4600 IN. |
| (A71140) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH .91

PAGE 549

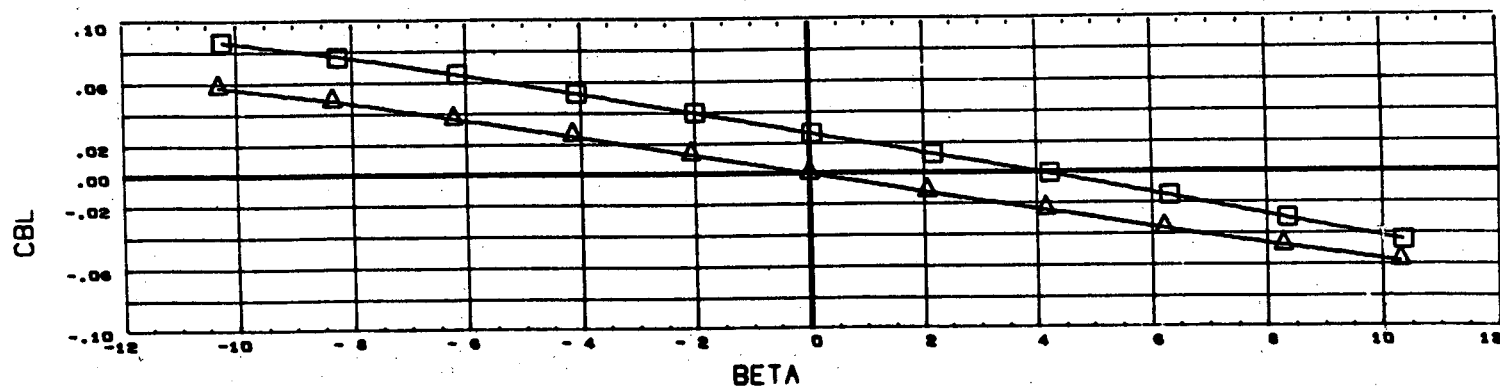
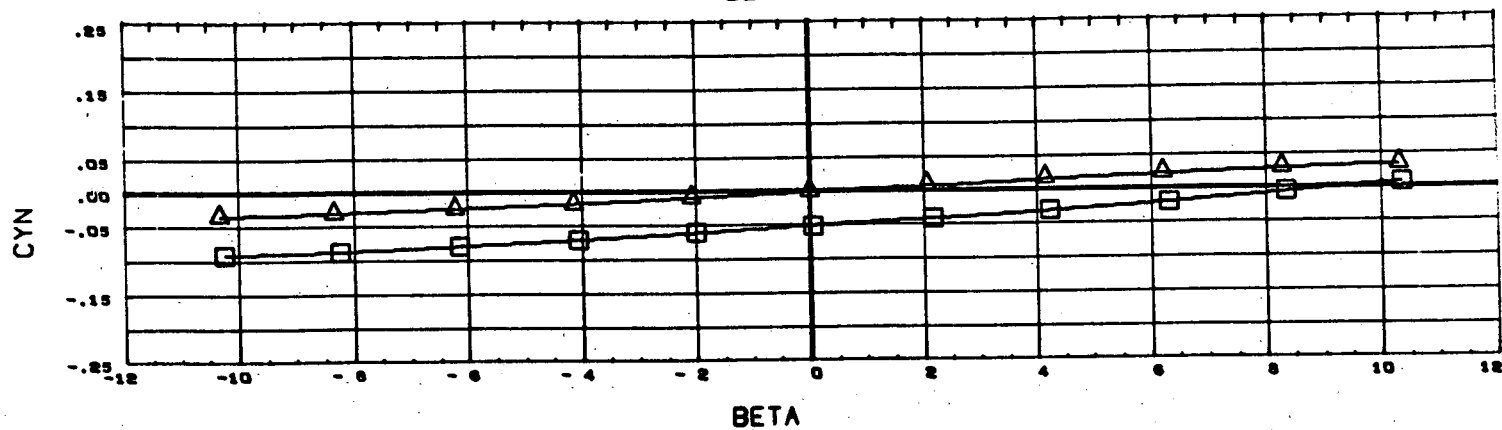
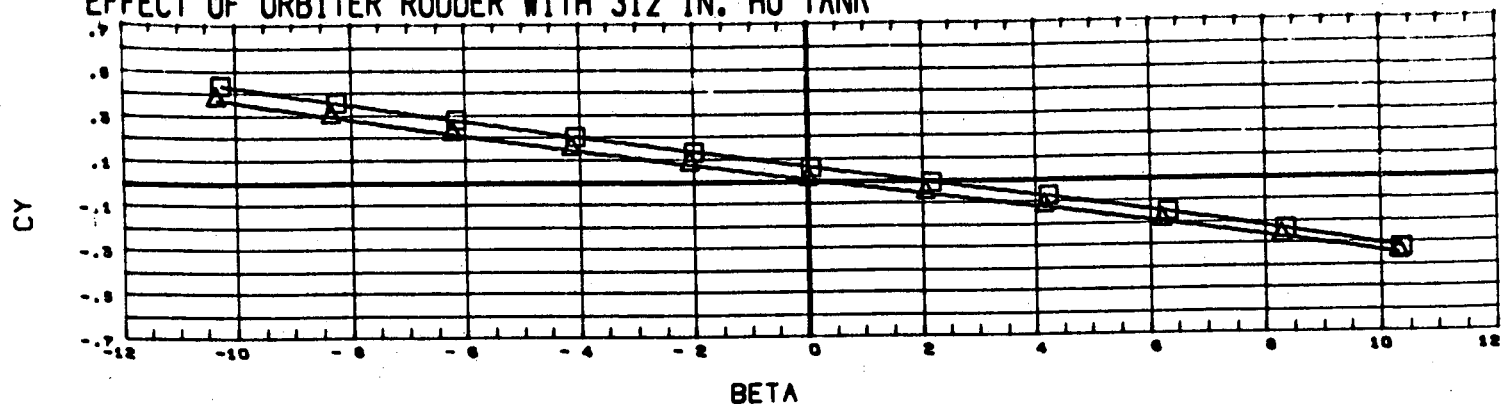
EFFECT OF ORBITER RUDDER WITH 312 IN. H₀ TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (C71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71138) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (A71140) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 1.19

EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK

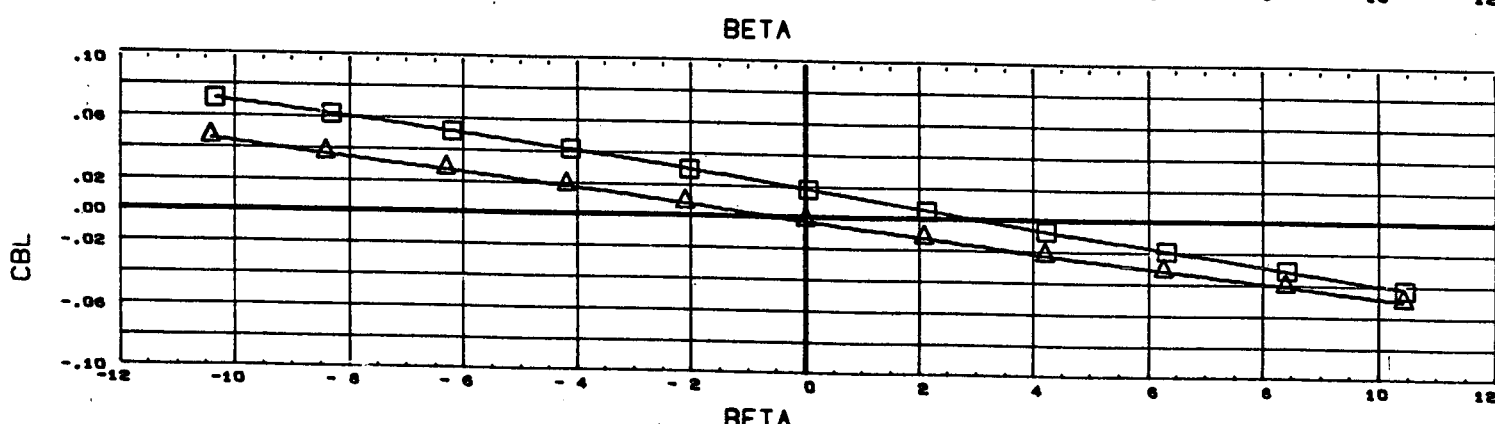
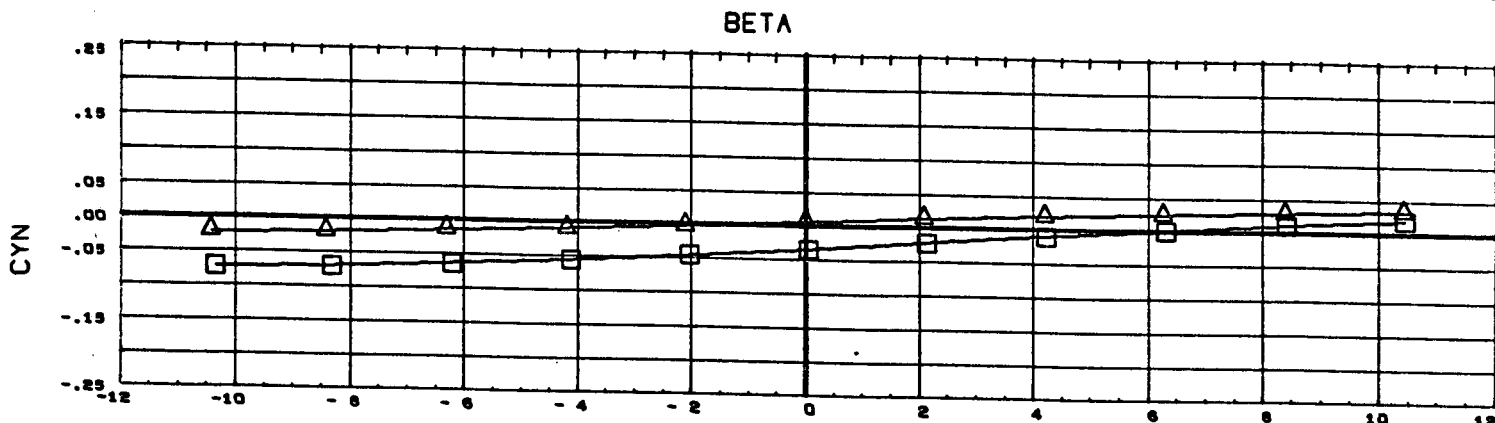
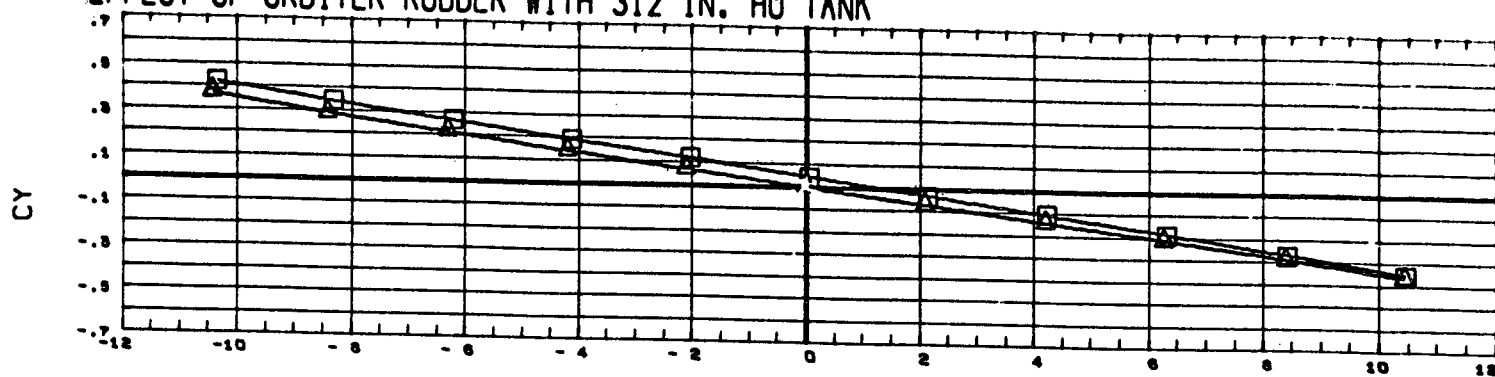


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|---------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 0.000 | SREF | 7.8600 SQ.IN. |
| (A71134) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.025 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.025 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (A71140) | NSFC TWT 544X LAUNCH VEHICLE STUDIES T90251 | 0.000 | 0.025 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH

1.46

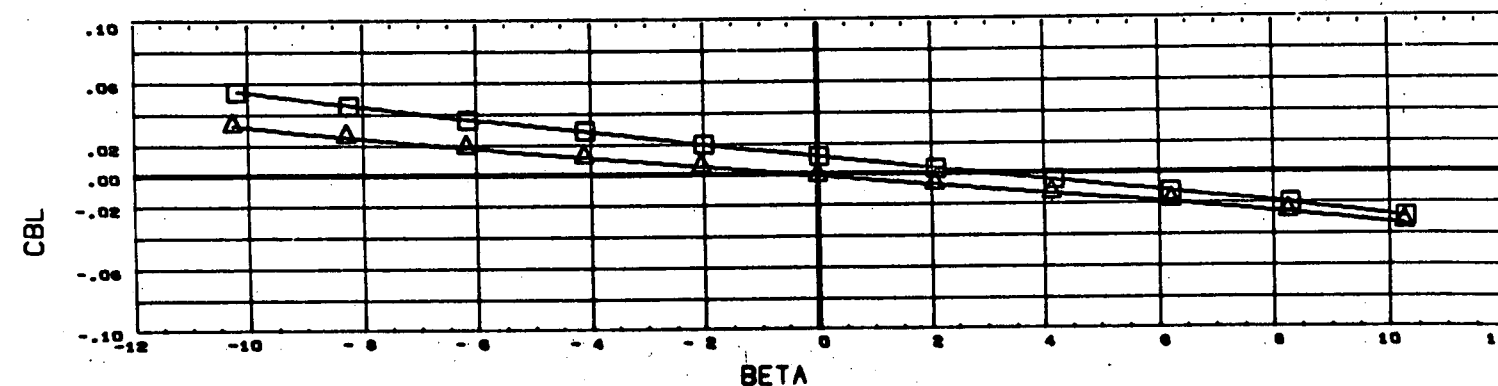
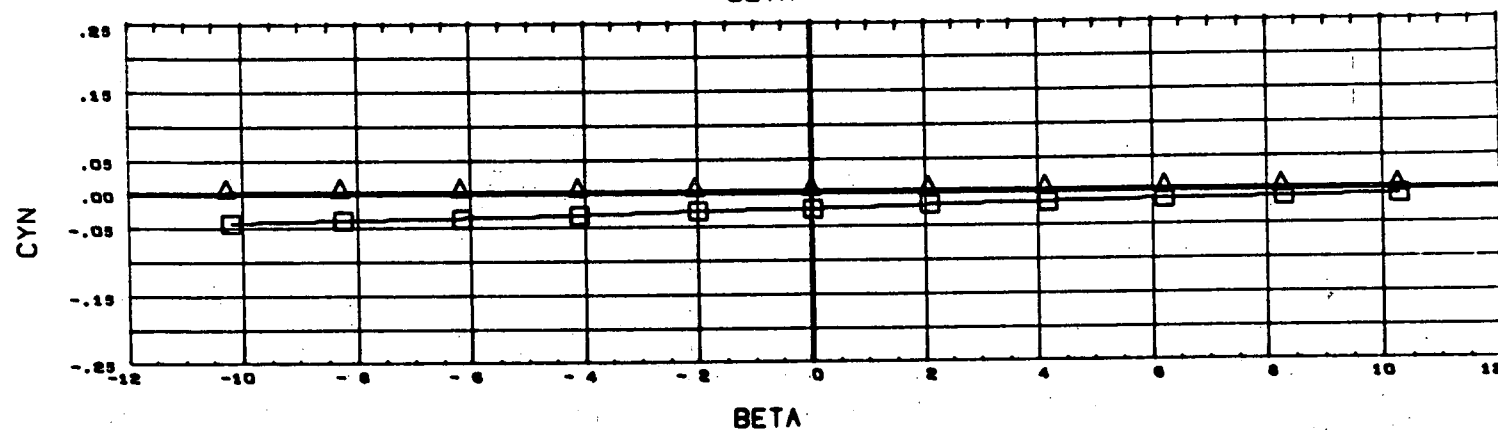
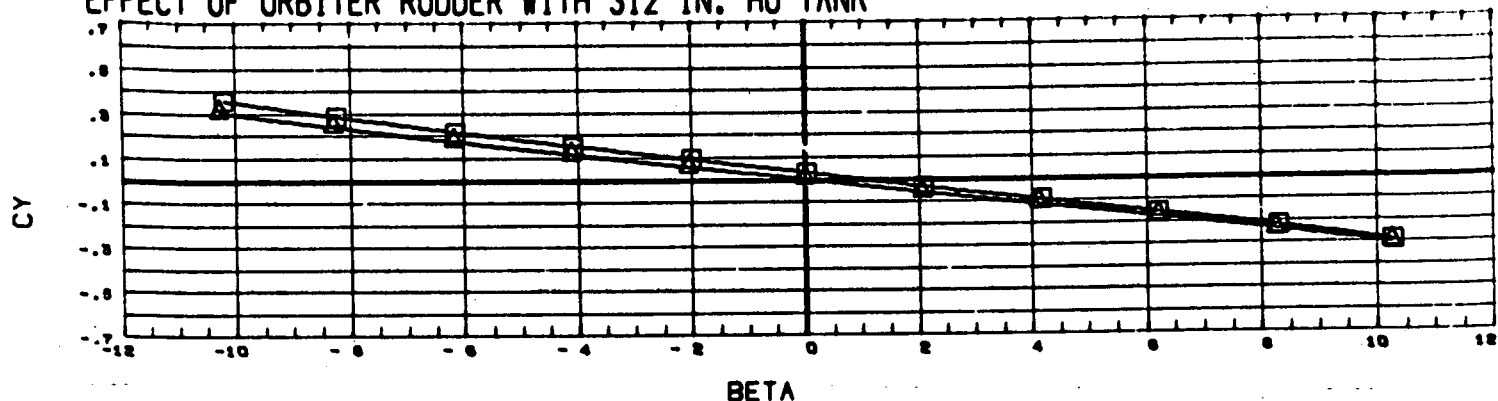
EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBITER | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---|---------|-------|--------|--------|-----------------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (A71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF 4.4600 IN. |
| (A71140) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP 3.3800 IN. |
| | | | | | | YMRP 0.0000 IN. |
| | | | | | | ZMRP 0.2480 IN. |
| | | | | | | SCALE 0.0040 SCALE |

MACH 1.95

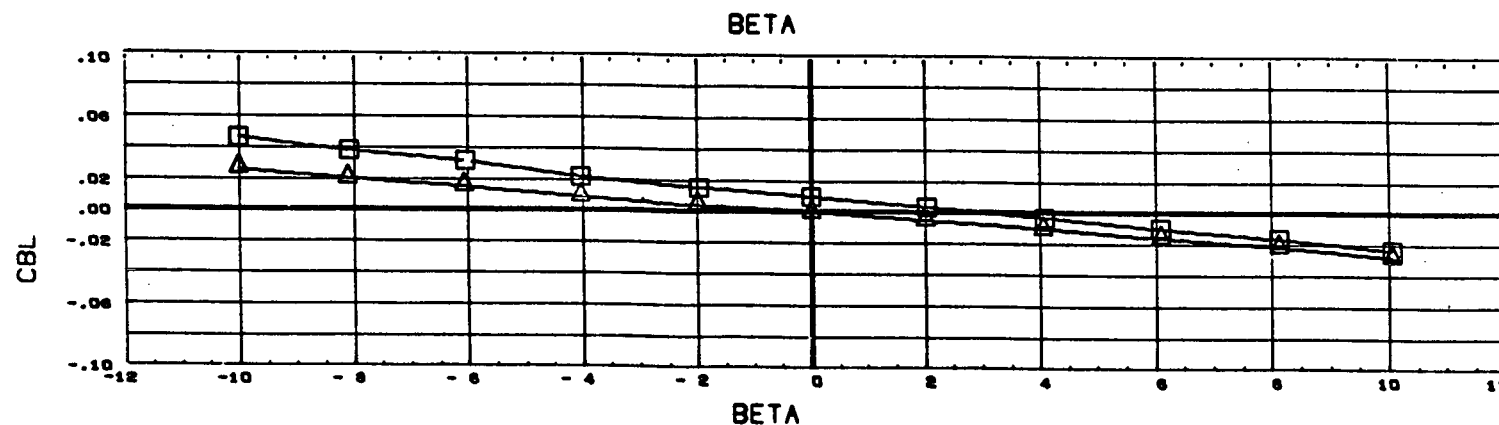
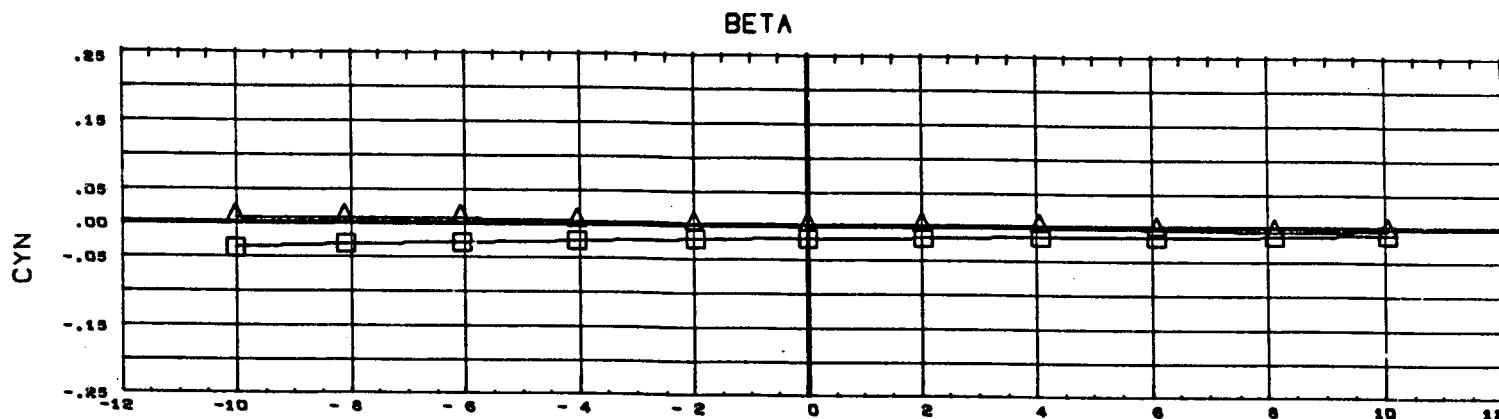
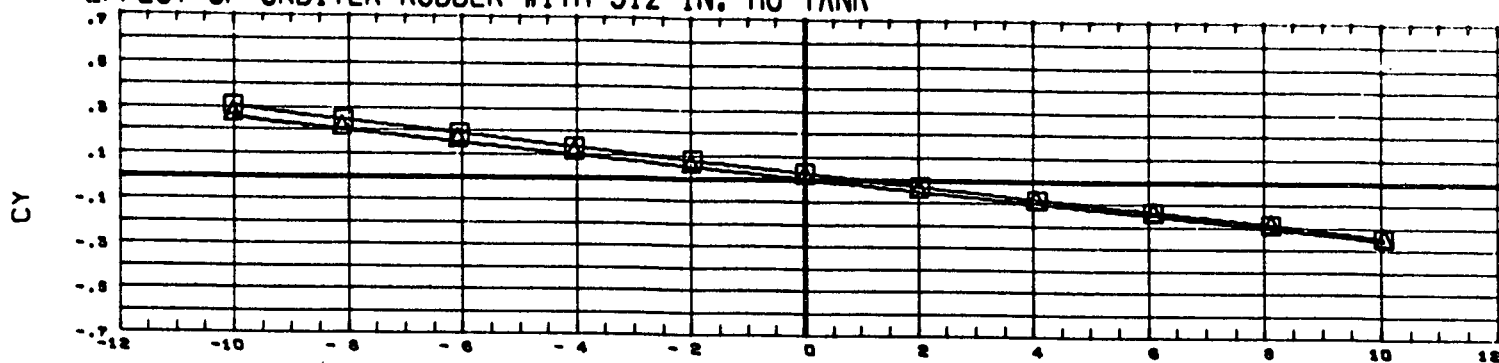
EFFECT OF ORBITER RUDDER WITH 312 IN. HO TANK



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6600 SQ. IN. |
| (A71134) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0260 IN. |
| (A71135) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREP | 4.4600 IN. |
| (A71140) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 3.48

EFFECT OF ORBITER RUDDER WITH 312 IN. HQ TANK

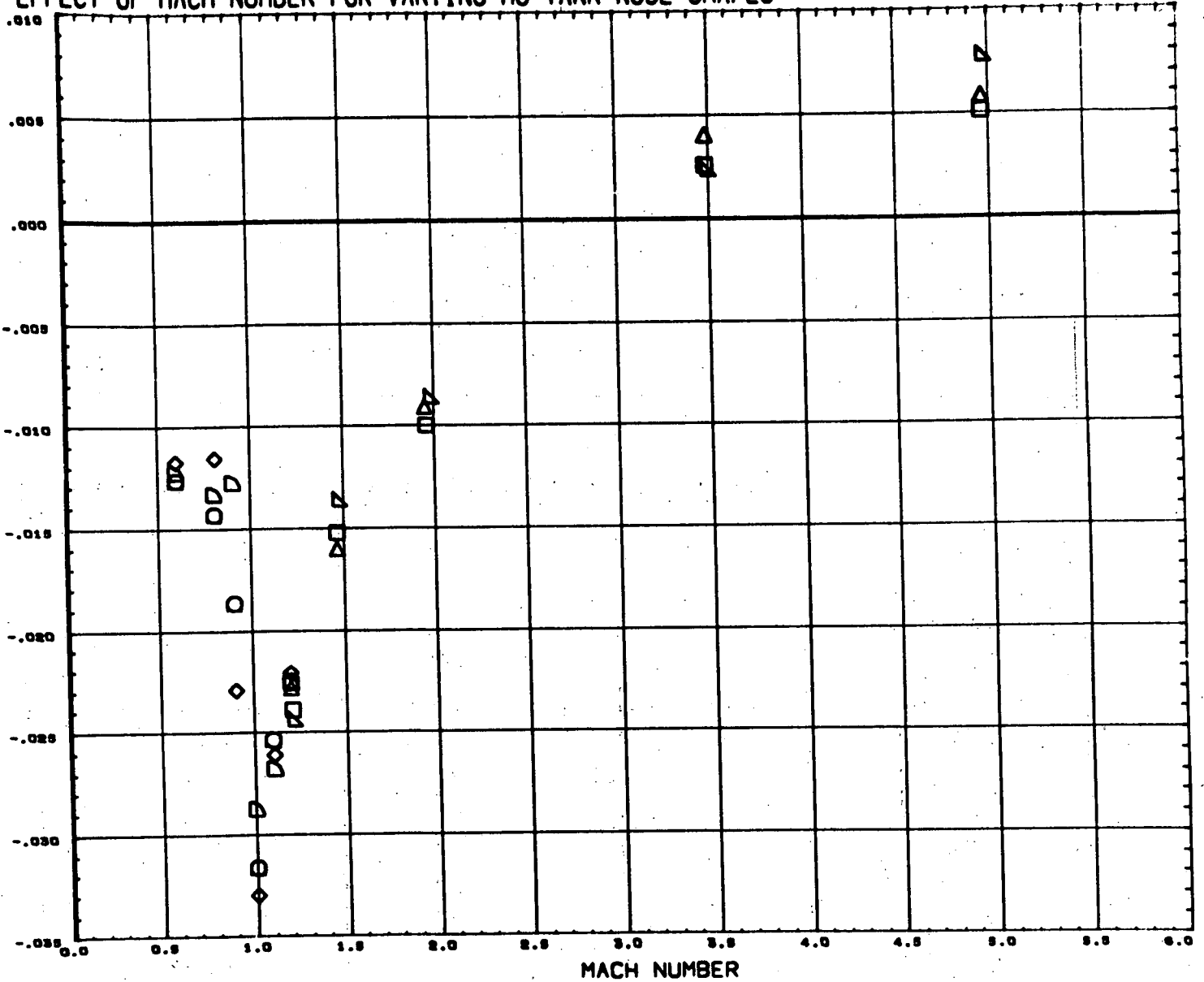


| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (C71136) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71134) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71138) | DATA NOT AVAILABLE FOR ALL CONDITIONS | 0.000 | 0.023 | 0.000 | 30.000 | BREF | 4.4600 IN. |
| (A71140) | MSFC TWT 344X LAUNCH VEHICLE STUDIES T90231 | 0.000 | 0.023 | 0.000 | 30.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

MACH 4.96

EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES

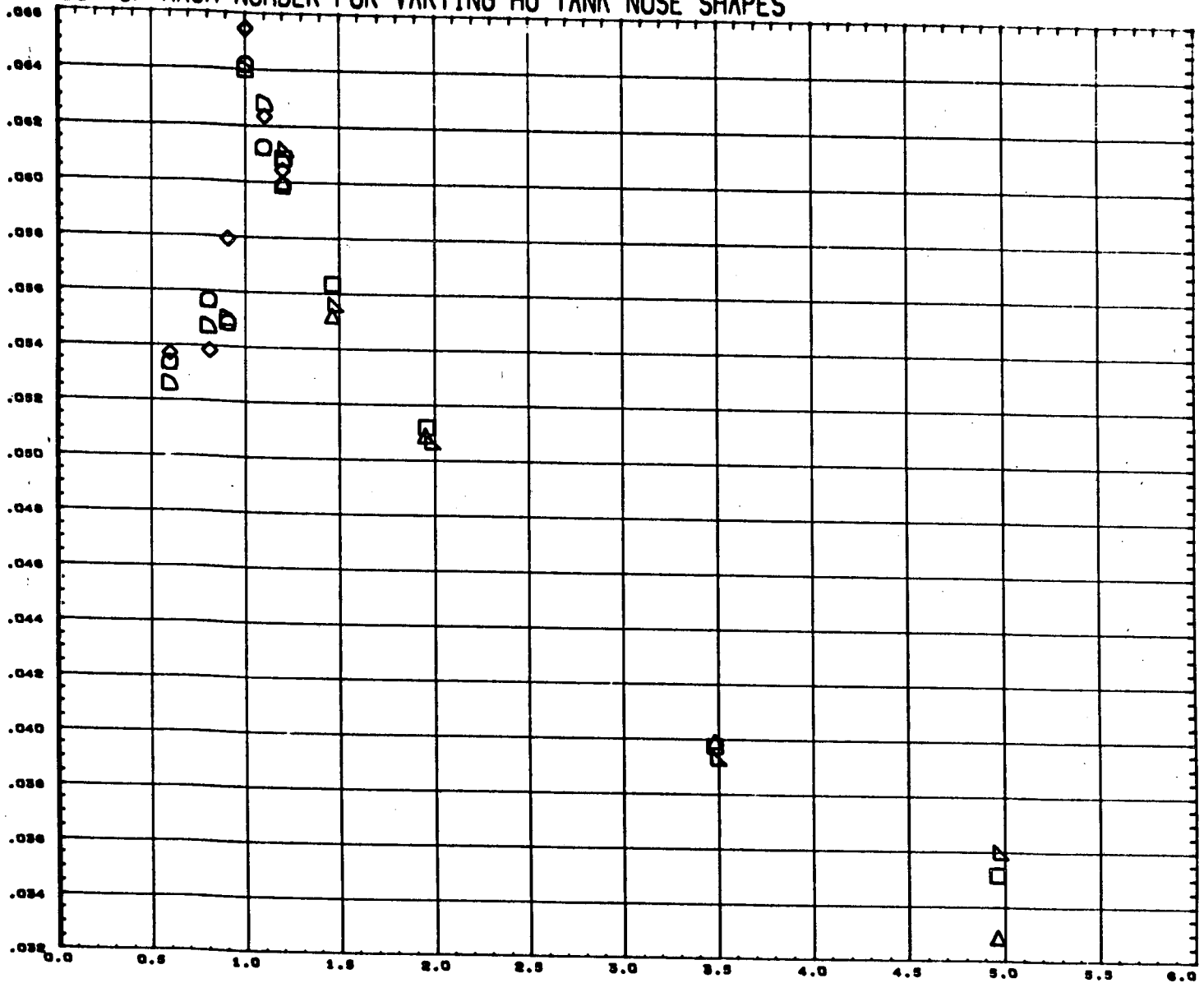
PITCHING MOMENT DERIVATIVE, D(CLM) PER DEGREE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (P71089) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8800 SQ. IN. |
| (P71091) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0280 IN. |
| (P71121) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T60131 | -1.500 | 0.023 | 0.000 | 0.000 | SREP | 4.4600 IN. |
| (P71123) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T60231 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (P71125) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T100231 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (P71127) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T100131 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES

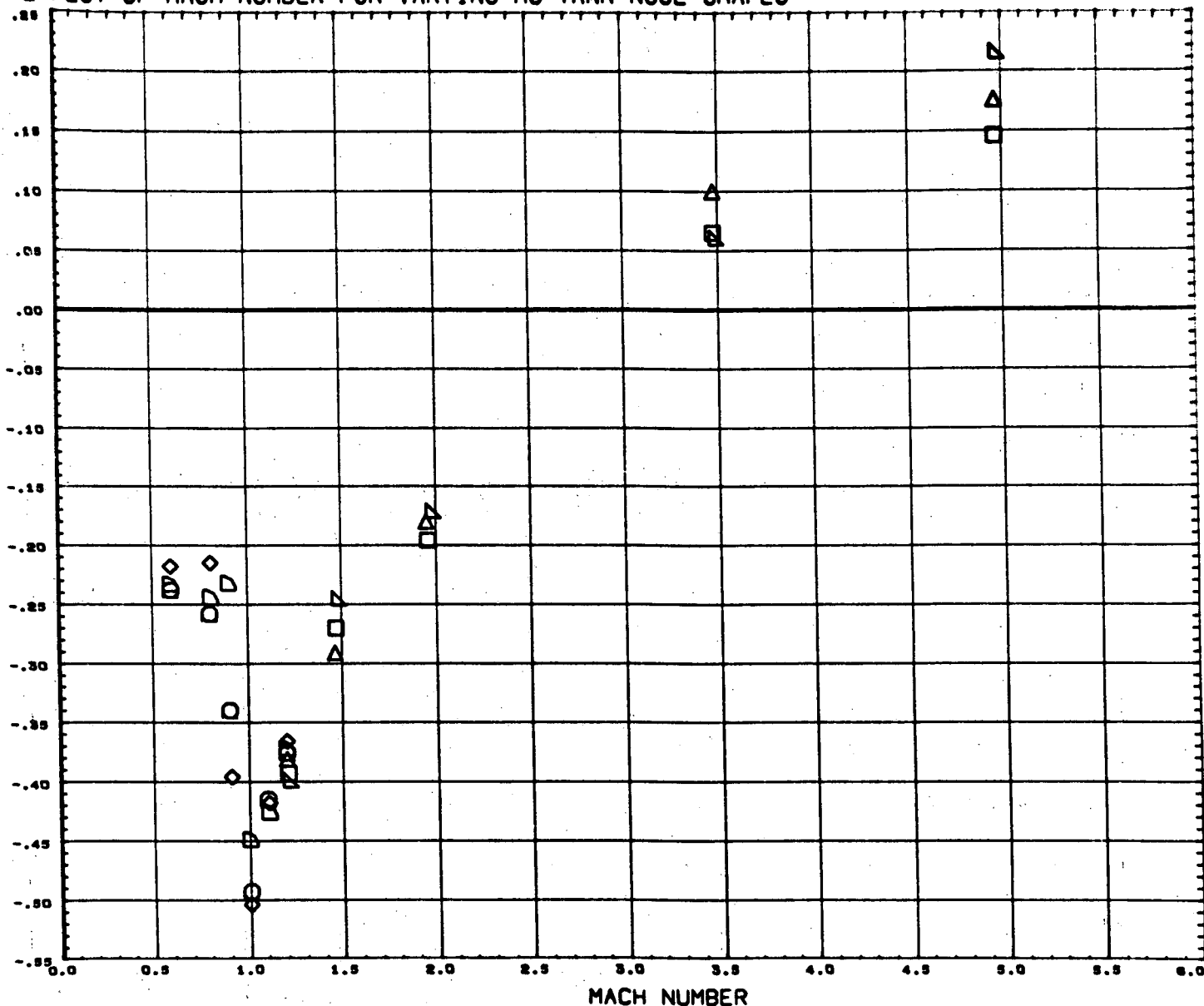
NORMAL FORCE DERIVATIVE, D(CN) PER DEGREE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBN | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|--|--------|-------|--------|--------|-----------------------|
| (P71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30131 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 sq.in. |
| (P71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T30231 | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0260 in. |
| (P71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T80131 | -1.500 | 0.023 | 0.000 | 0.000 | BREF 4.4600 in. |
| (P71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T80231 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 in. |
| (P71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T100231 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP 0.0000 in. |
| (P71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T100131 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP 0.2480 in. |
| | | | | | | SCALE 0.3040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES

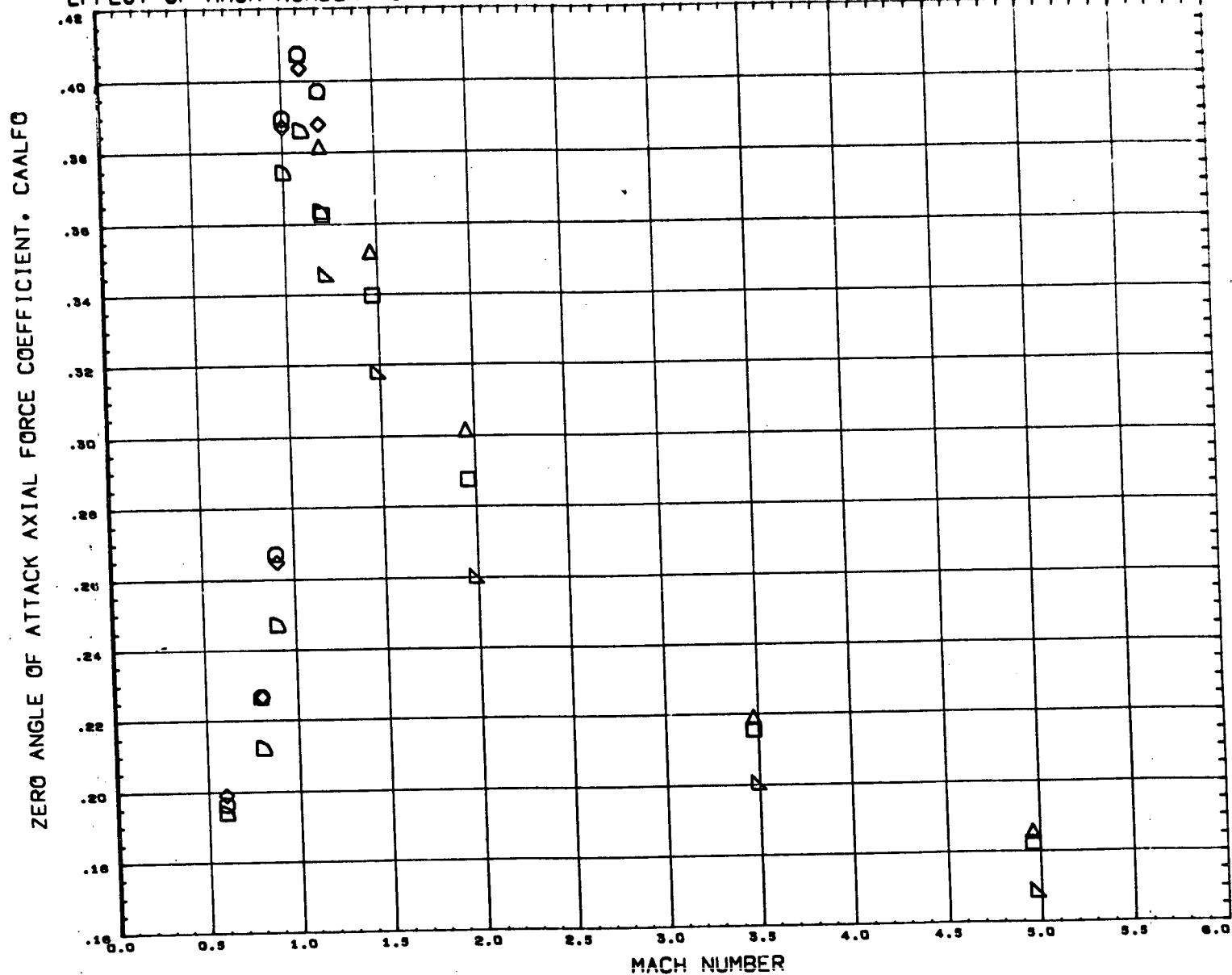
DERIVATIVE OF PITCHING MOMENT WITH RESPECT TO NORMAL FORCE. DCLM/DCN



MACH NUMBER

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (771099) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (771091) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (771121) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T601S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (771123) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T602S1 | -1.500 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| (771125) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YHRP | 0.0000 IN. |
| (771127) | HSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZHRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

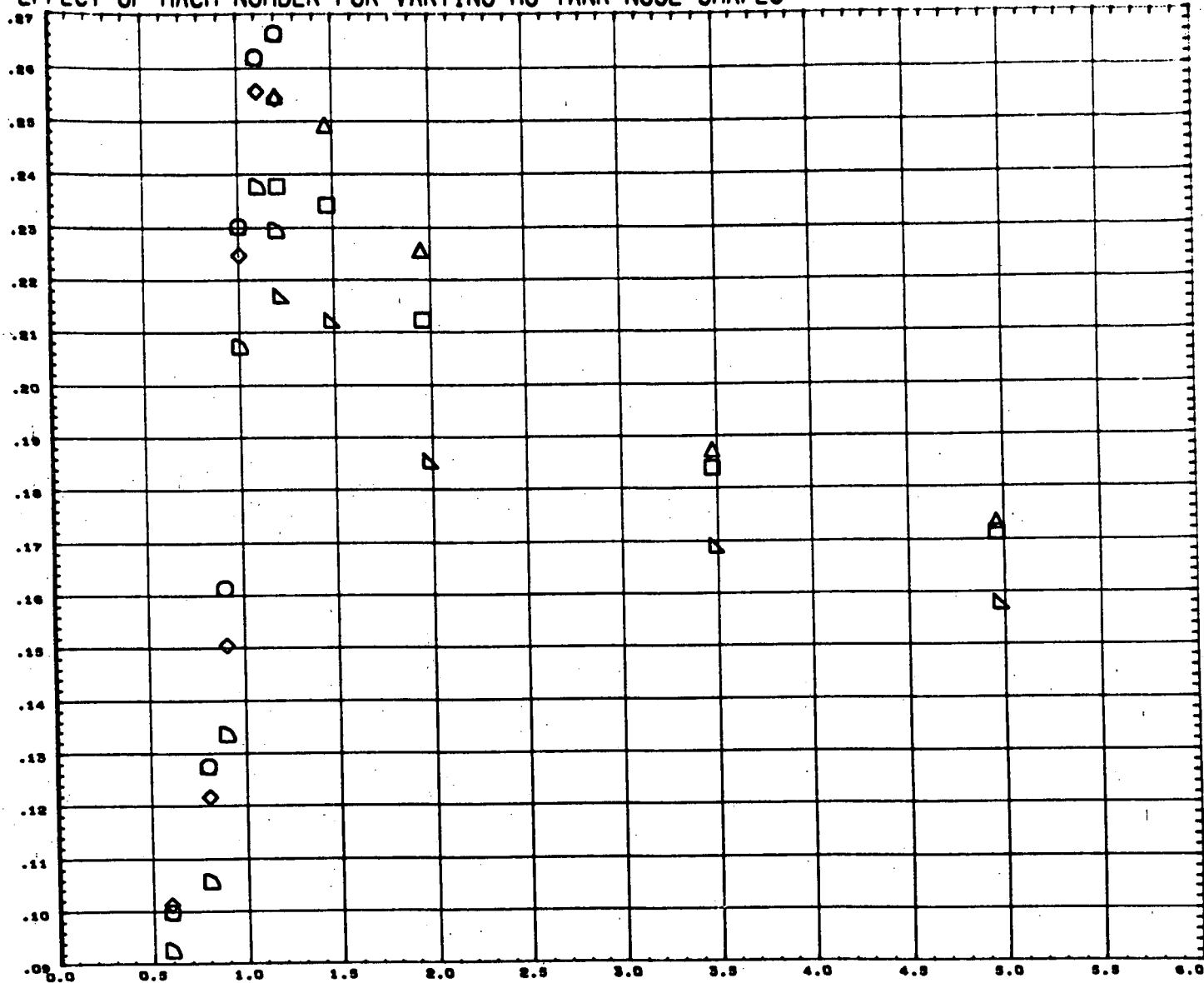
EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBNIC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|---------------|
| (F71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 34.IN. |
| (F71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (F71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (F71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| (F71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP | 0.0000 IN. |
| (F71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES

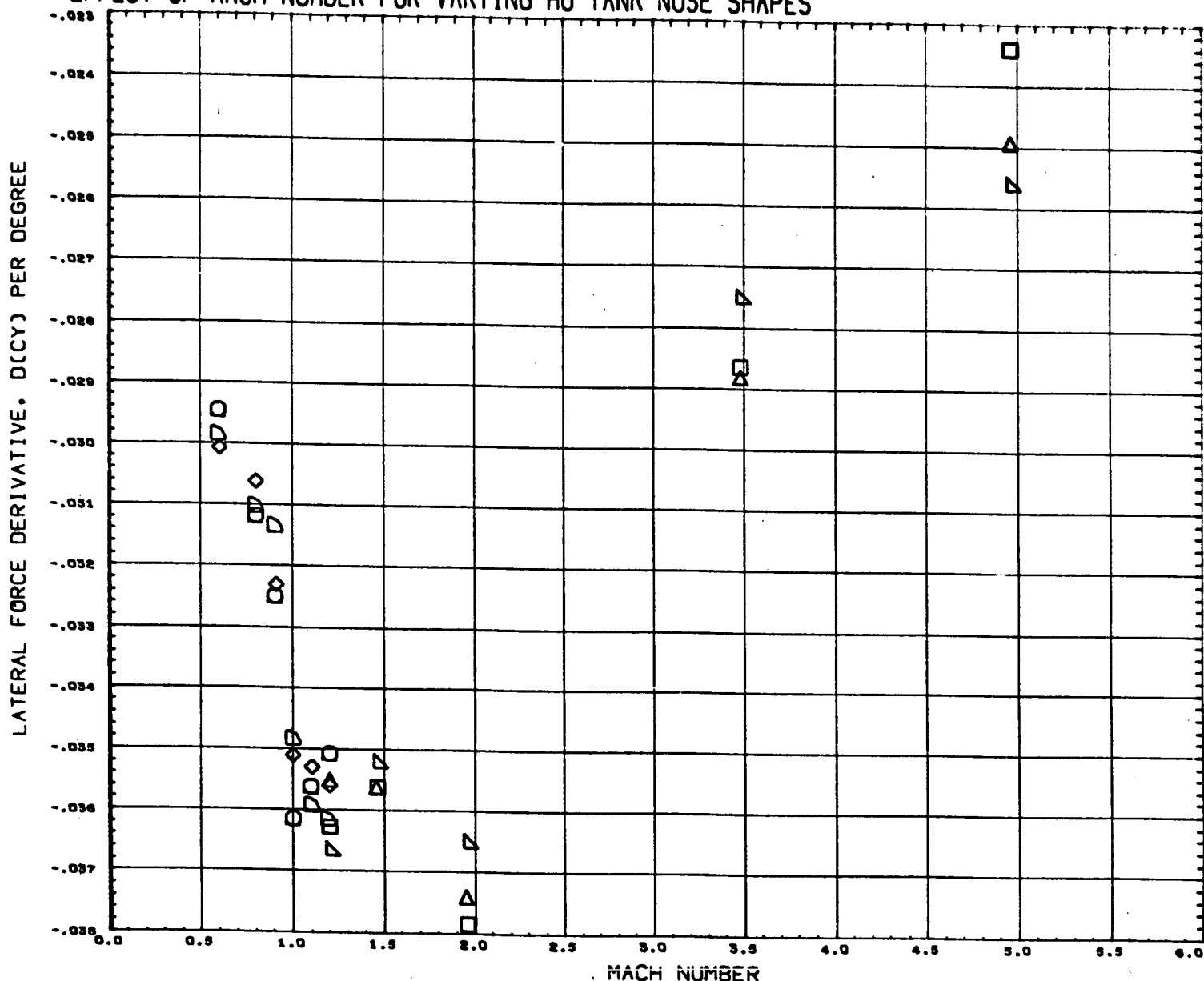
ZERO ANGLE OF ATTACK FOREBODY AXIAL FORCE COEFFICIENT, C_{FAFO}



MACH NUMBER

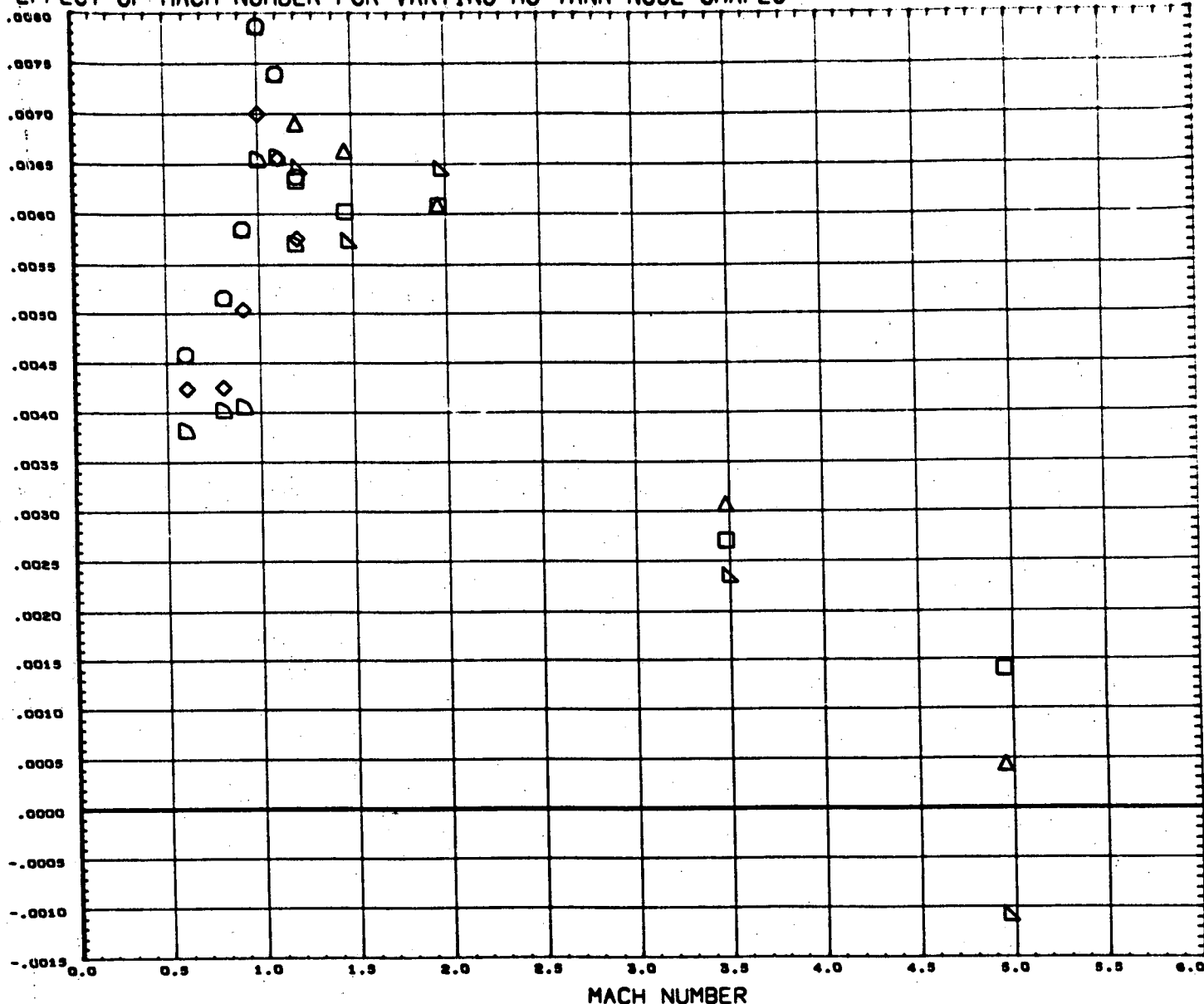
| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORIGIN | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (F71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (F71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (F71121) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (F71123) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XHRP | 3.3600 IN. |
| (F71125) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YHRP | 0.0000 IN. |
| (F71127) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZHRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES



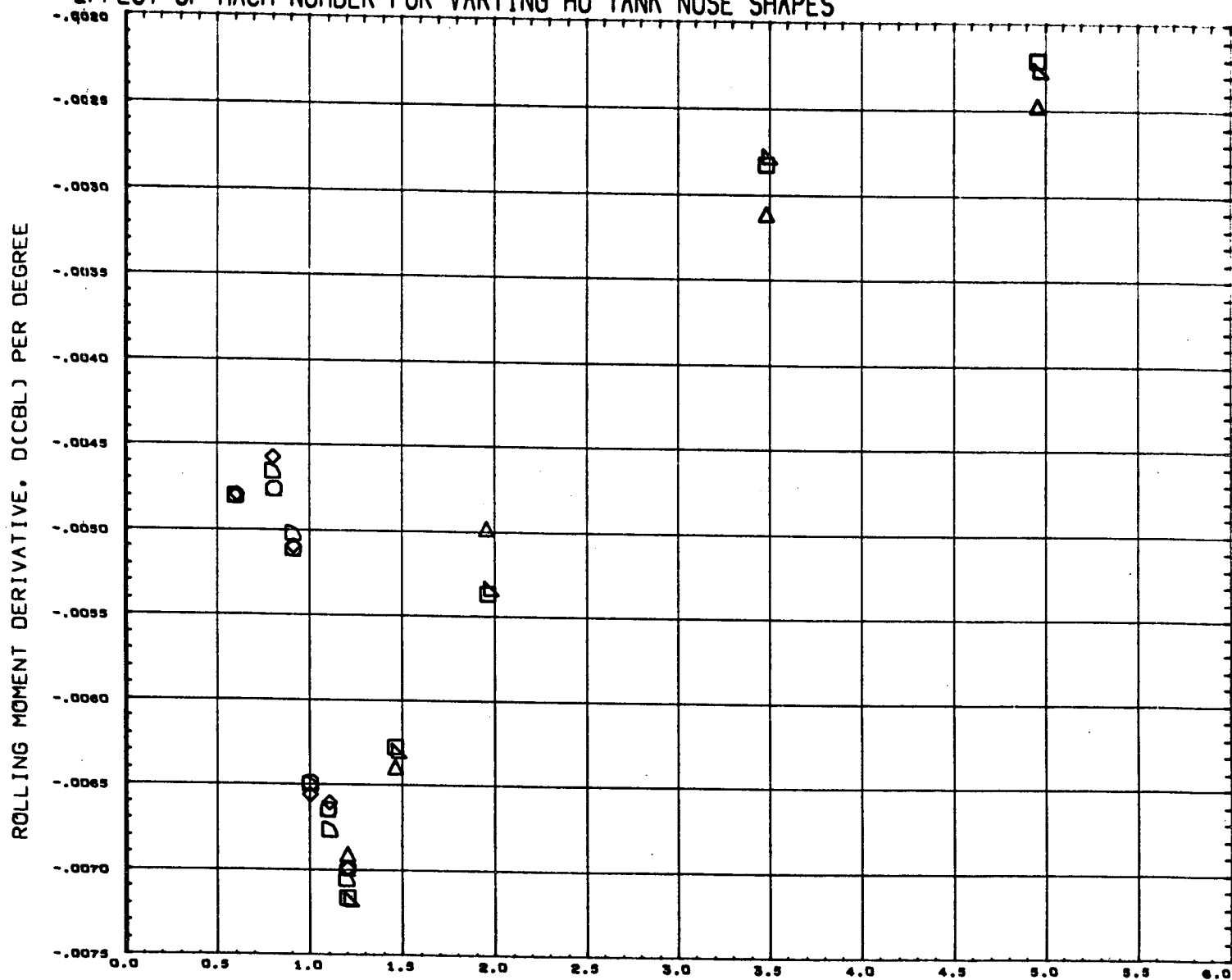
EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES

YAWING MOMENT DERIVATIVE, D(CYN) PER DEGREE



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|--|--------|-------|--------|--------|-----------------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF 2.0280 IN. |
| (A71122) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | SREF 4.4600 IN. |
| (A71124) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| (A71126) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRP 0.0000 IN. |
| (A71128) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRP 0.2480 IN. |
| (A71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES | | | | | SCALE 0.0040 SCALE |

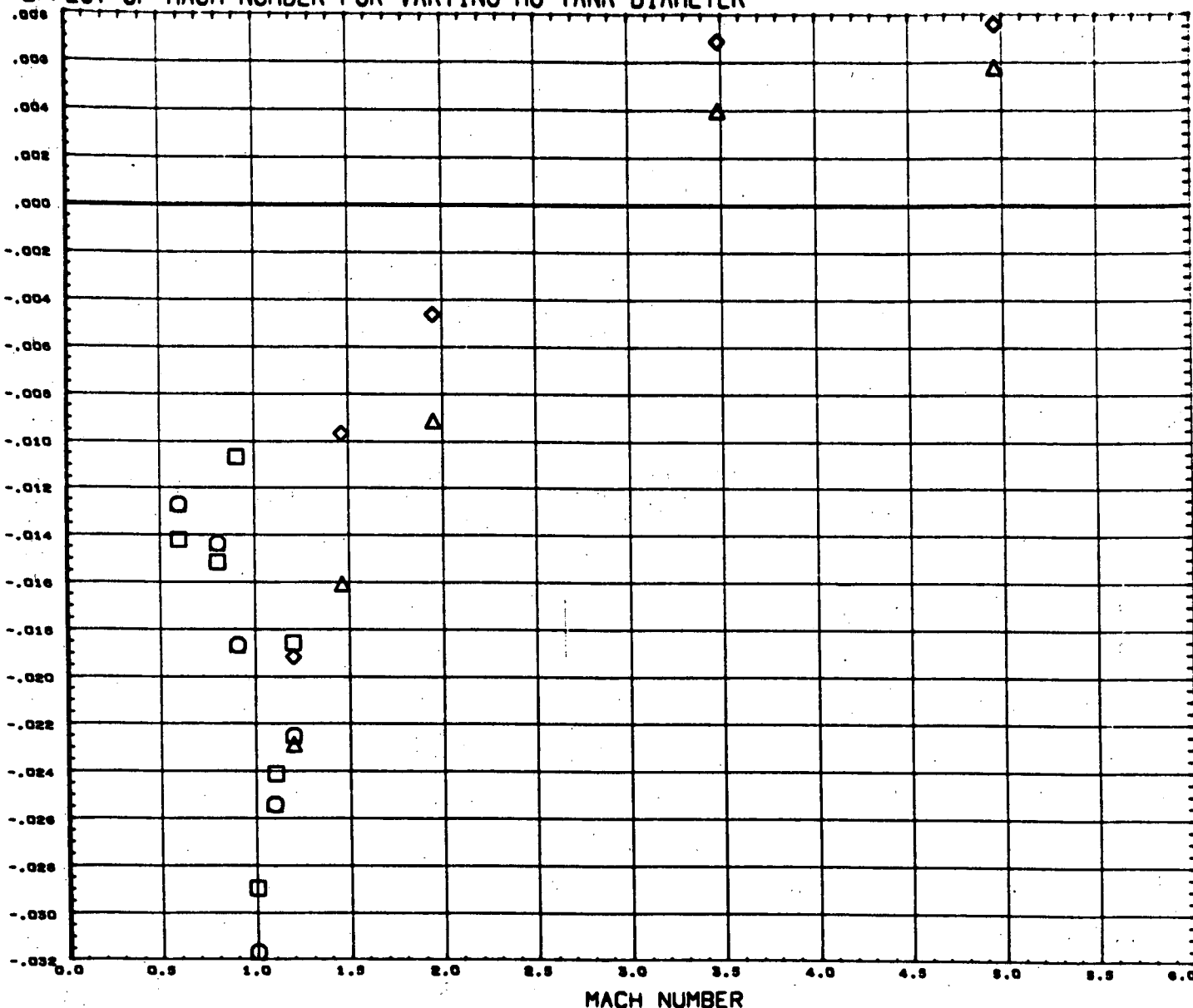
EFFECT OF MACH NUMBER FOR VARYING HO TANK NOSE SHAPES



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|--|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71122) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T801S1 | -1.500 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71124) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T802S1 | -1.500 | 0.023 | 0.000 | 0.000 | XMRF | 3.3600 IN. |
| (A71126) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1002S1 | -1.500 | 0.023 | 0.000 | 0.000 | YMRF | 0.0000 IN. |
| (A71129) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T1001S1 | -1.500 | 0.023 | 0.000 | 0.000 | ZMRF | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER

PITCHING MOMENT DERIVATIVE, D(CLM) PER DEGREE

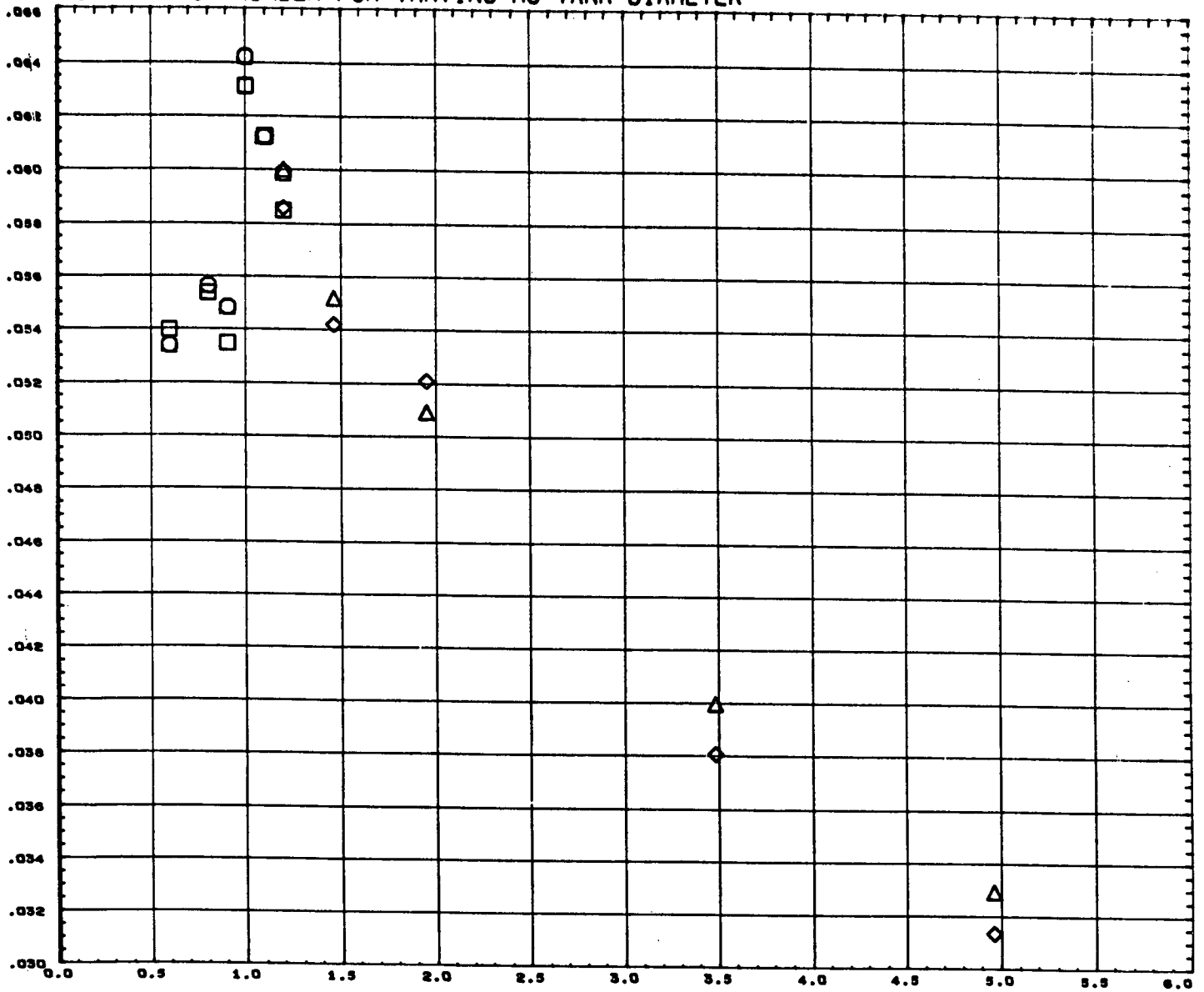


MACH NUMBER

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION |
|-----------------|---|--------|-------|--------|--------|-----------------------|
| (F71069) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREP 7.8800 80. IN. |
| (F71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREP 2.0260 IN. |
| (F71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREP 4.4600 IN. |
| (F71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP 3.3600 IN. |
| | | | | | | YMRP 0.0000 IN. |
| | | | | | | ZMRP 0.2460 IN. |
| | | | | | | SCALE 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING H₀ TANK DIAMETER

NORMAL FORCE DERIVATIVE, D(CN) PER DEGREE

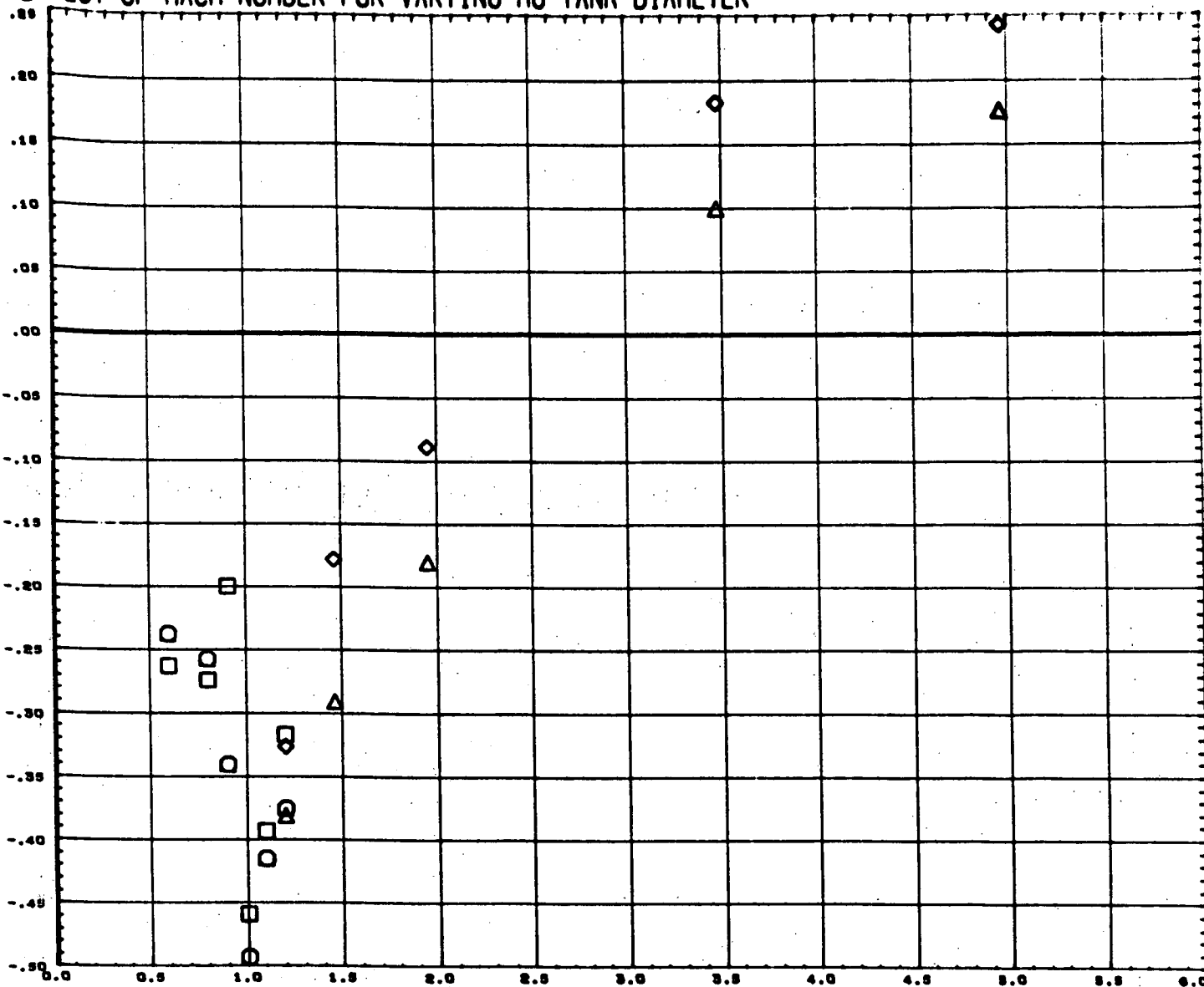


MACH NUMBER

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (F71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (F71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (F71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4800 IN. |
| (F71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

DERIVATIVE OF PITCHING MOMENT WITH RESPECT TO NORMAL FORCE, DCLM/DCN

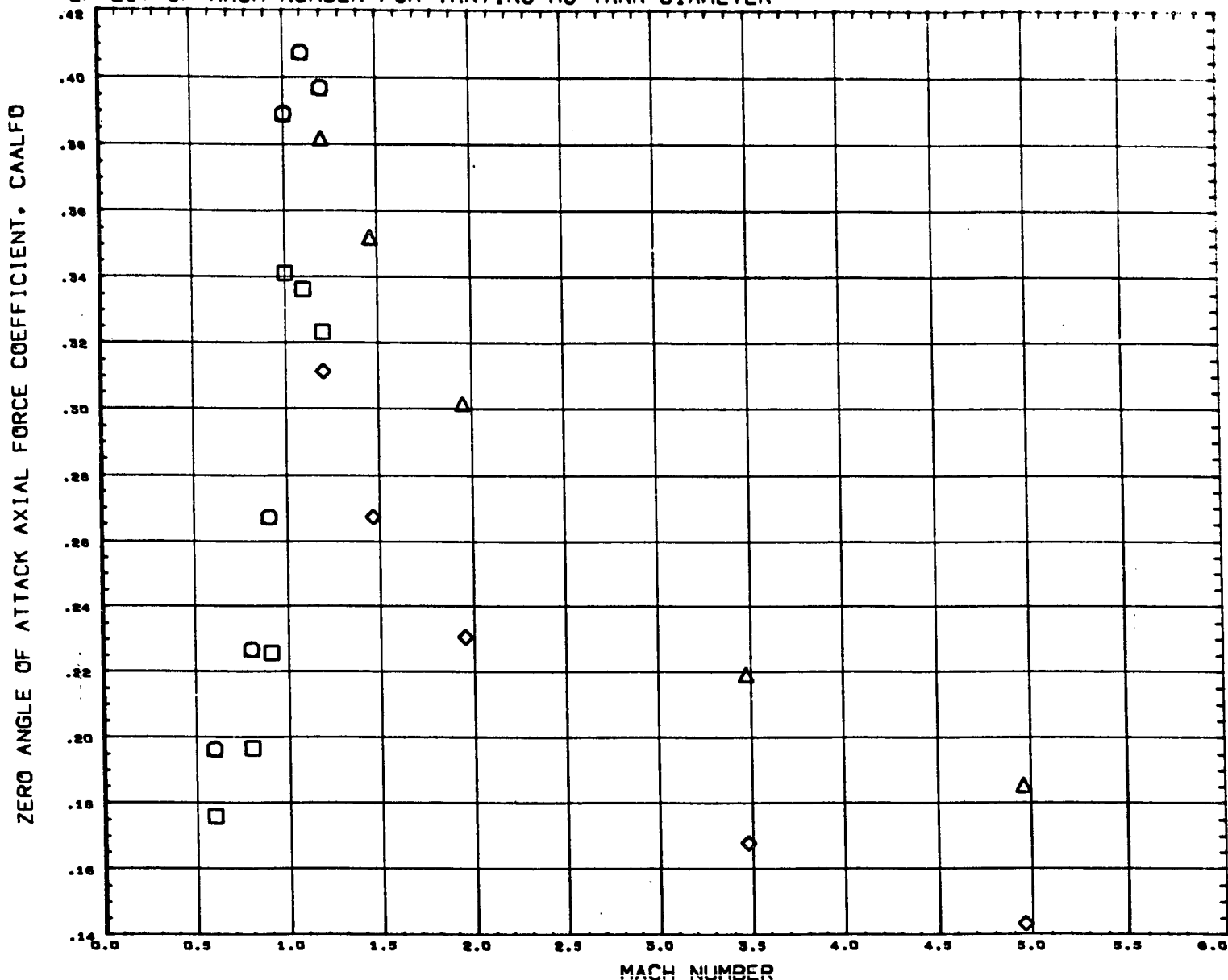
EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER



MACH NUMBER

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (771089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.6600 SQ. IN. |
| (771091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0280 IN. |
| (771133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREP | 4.4600 IN. |
| (771135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER

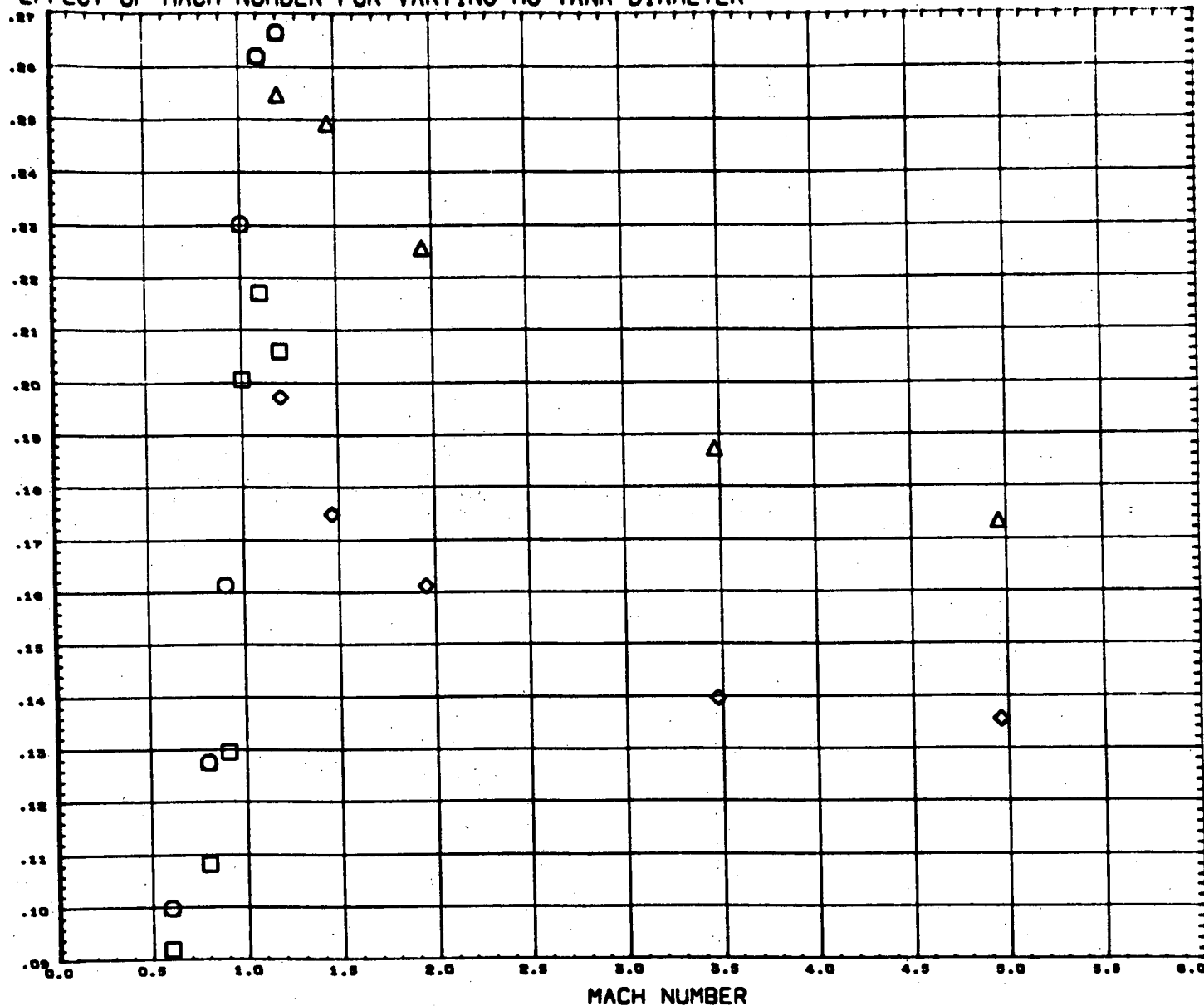


MACH NUMBER

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (P71089) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (P71091) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (P71133) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (P71135) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

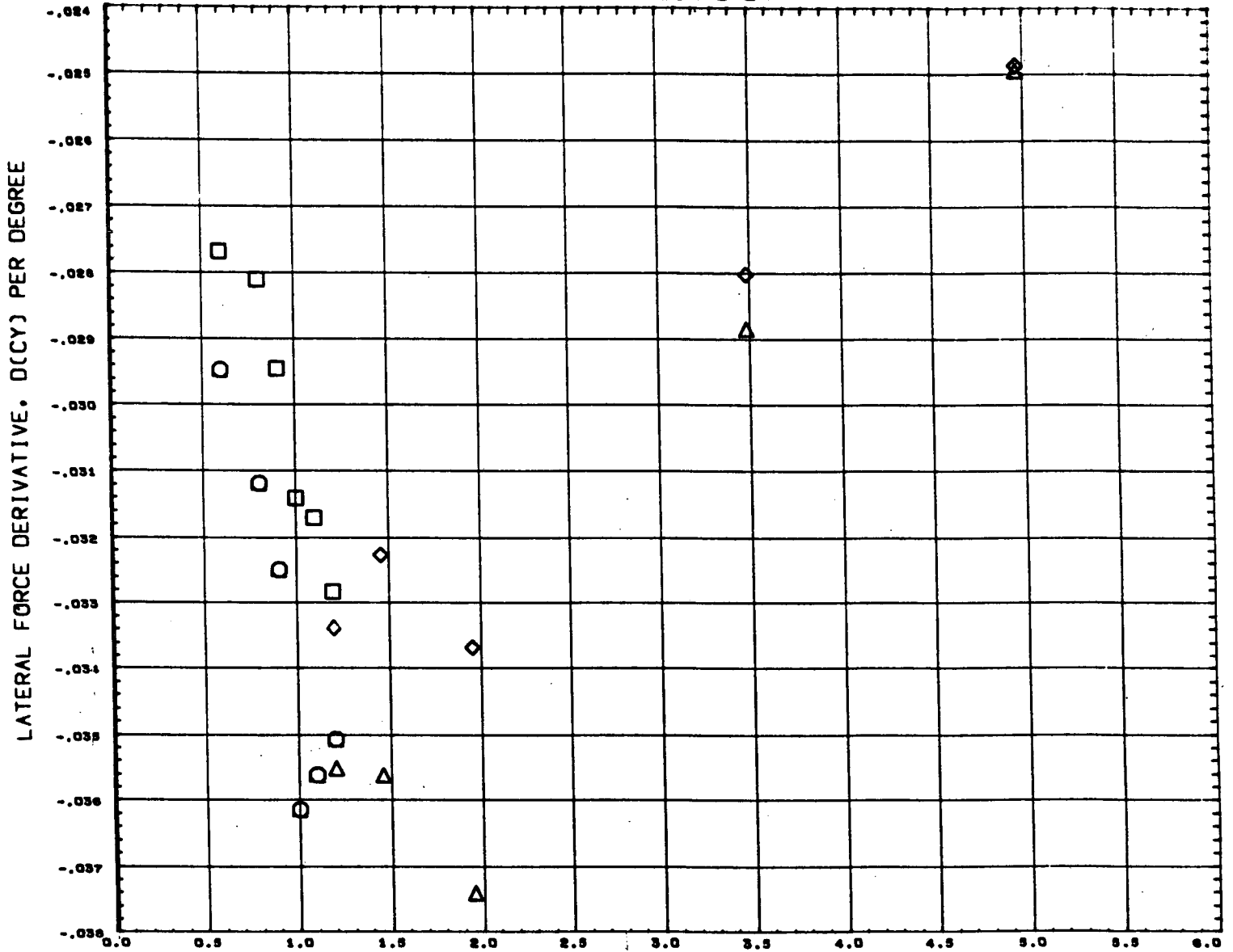
ZERO ANGLE OF ATTACK FOREBODY AXIAL FORCE COEFFICIENT, CAFAFO

EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER



| DATA SET | SYMBOL | CONFIGURATION DESCRIPTION | TSO1S1 | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|----------|--------|--------------------------------------|--------|--------|-------|--------|--------|-----------------------|---------------|
| (F71089) | ○ | MSFC TWT 544X LAUNCH VEHICLE STUDIES | TSO1S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 7.8800 80.IN. |
| (F71091) | △ | MSFC TWT 544X LAUNCH VEHICLE STUDIES | TSO2S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREP | 2.0280 IN. |
| (F71133) | ◇ | MSFC TWT 544X LAUNCH VEHICLE STUDIES | TSO2S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREP | 4.4800 IN. |
| (F71135) | □ | MSFC TWT 544X LAUNCH VEHICLE STUDIES | TSO1S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | | | YMRP | 0.0000 IN. |
| | | | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | | | SCALE | 0.0040 SCALE |

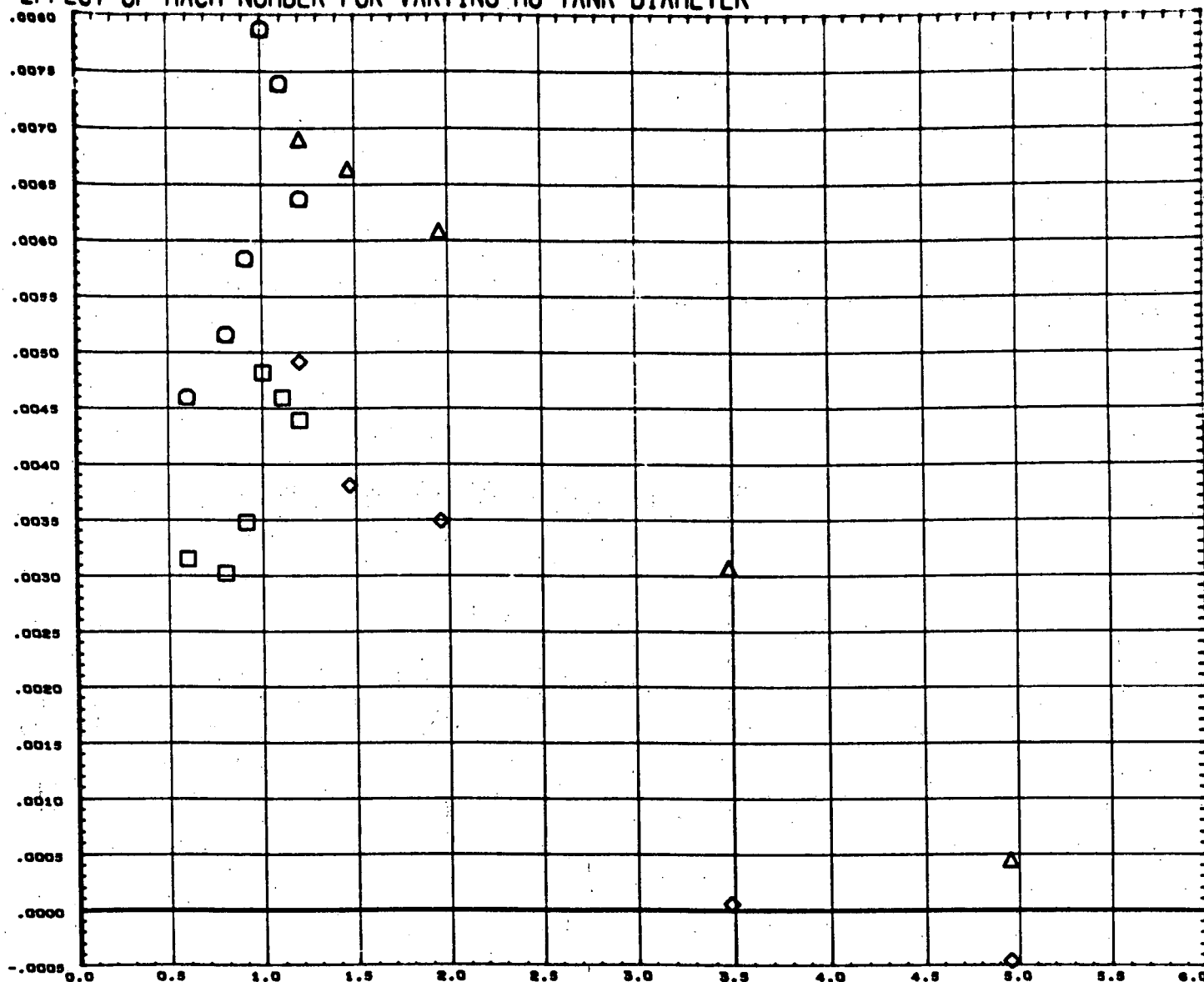
EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8600 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0260 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2460 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER

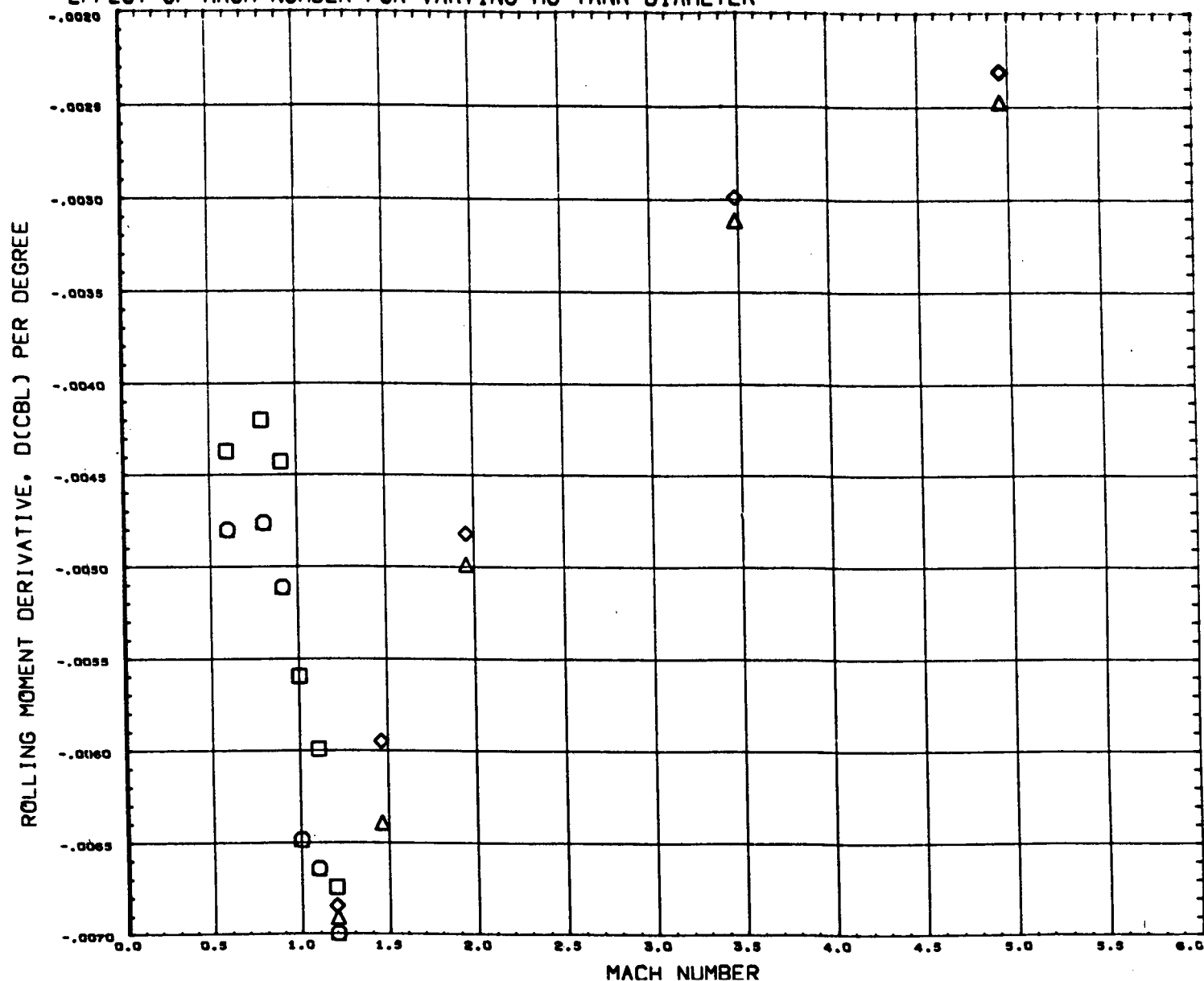
YAWING MOMENT DERIVATIVE, D(CYN) PER DEGREE



MACH NUMBER

| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.6800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 3.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 SCALE |

EFFECT OF MACH NUMBER FOR VARYING HO TANK DIAMETER



| DATA SET SYMBOL | CONFIGURATION DESCRIPTION | ORBINC | YS | ELEVTR | RUDDER | REFERENCE INFORMATION | |
|-----------------|---|--------|-------|--------|--------|-----------------------|----------------|
| (A71090) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T301S1 | 0.000 | 0.023 | 0.000 | 0.000 | SREF | 7.8800 SQ. IN. |
| (A71092) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T302S1 | 0.000 | 0.023 | 0.000 | 0.000 | LREF | 2.0280 IN. |
| (A71134) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T902S1 | 0.000 | 0.023 | 0.000 | 0.000 | BREF | 4.4600 IN. |
| (A71136) | MSFC TWT 544X LAUNCH VEHICLE STUDIES T901S1 | 0.000 | 0.023 | 0.000 | 0.000 | XMRP | 3.3600 IN. |
| | | | | | | YMRP | 0.0000 IN. |
| | | | | | | ZMRP | 0.2480 IN. |
| | | | | | | SCALE | 0.0040 \$SCALE |